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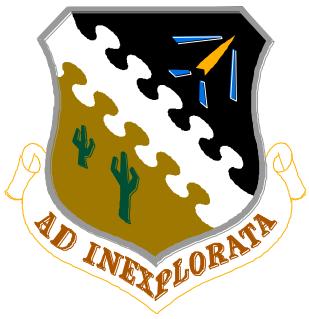

ENVIRONMENTAL ASSESSMENT FOR INSTALLATION OF A NEW JET ENGINE TEST CELL EDWARDS AIR FORCE BASE, CALIFORNIA

September 2012

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412th Test Wing
Civil Engineering Division
Environmental Management Branch
Edwards Air Force Base, California

Report Documentation Page

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14. ABSTRACT
The Proposed Action involves the installation of a new 35,000 square feet JETC facility with 15,000 square feet storage barn at Edwards AFB. The new facility would be located on the Main Base near the existing maintenance facility (Building 3810). The new JETC facility would include a total of three test cells, with one cell capable of testing 150,000 pound thrust class engines, another cell capable of testing 100,000 pound multi-vectoring thrust class engines and a third cell capable of running 100,000 pound thrust class engines. In addition to the new JETC facility, Edwards AFB is also proposing to construct a 15,000 square foot storage barn. The existing JETC at Building 3804 would remain operational for testing of small jet engines.

15. SUBJECT TERMS
Installation Jet Engine Test Cell JETC Edwards Air Force Base Environmental Assessment

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FINDING OF NO SIGNIFICANT IMPACT FOR INSTALLATION AND OPERATION OF A JET ENGINE TEST CELL AT EDWARDS AIR FORCE BASE, CALIFORNIA

1.0 Name of Action

Installation of a New Jet Engine Test Cell (JETC), Edwards Air Force Base (AFB), California

2.0 Description of the Proposed Actions and Alternatives

Proposed Action

The Proposed Action involves the installation of a new 35,000 square feet JETC facility with 15,000 square feet storage barn at Edwards AFB. The new facility would be located on the Main Base near the existing maintenance facility (Building 3810). The new JETC facility would include a total of three test cells, with one cell capable of testing 150,000 pound thrust class engines, another cell capable of testing 100,000 pound multi-vectoring thrust class engines and a third cell capable of running 100,000 pound thrust class engines. In addition to the new JETC facility, Edwards AFB is also proposing to construct a 15,000 square foot storage barn. The existing JETC at Building 3804 would remain operational for testing of small jet engines.

Alternative Action

The alternative action involves upgrading/repairing the existing 33,000 square foot JETC facility at Building 3804. Under this alternative, the existing JETC facility would undergo extensive repairs and modifications to upgrade the facility.

No Action

The no action alternative involves continued use of the existing JETC facility at Building 3804 for smaller jet engine testing. Testing for larger jet engines would have to occur at an off-base testing facility.

3.0 Summary of Environmental Consequences

It is anticipated that the Proposed Action would have no significant impacts on the environment for the following reasons:

1. There would be no irrevocable loss or destruction of any natural or cultural resource. The impact on flora and fauna and other natural resources is minimal considering the project site area is already highly disturbed and does not contain sensitive habitat or species. In addition, past biological surveys found no threatened or endangered species occurring onsite. The proposed project site is located in a low sensitive area for cultural resources according to the Edwards AFB General Plan, dated 2011.

2. The Proposed Action is consistent with the National Environmental Policy Act. The Proposed Action is consistent with State and Federal environmental and planning

policies.

3. The Proposed Action will have no adverse effects on public health and safety as the project will comply with all required occupational health and safety guidelines and practices.

4. The Proposed Action will not involve secondary impacts, such as population changes or effects on public facilities such as libraries and schools.

5. There is no degradation of environmental quality. The Proposed Action would be located within the developed areas of Main Base, therefore, the environmental quality in the project area would remain unchanged or, possibly, improved due to remediation of possible contaminated soils from a groundwater plume in the project area.

6. Cumulative impacts upon the environment are not significant; nor does the Proposed Action involve a commitment of greater amounts of natural resources. Construction will be organized in such a manner as to limit impacts on the surrounding area.

7. The Proposed Action will not substantially affect rare, threatened, or endangered species, or their habitats at the project site. There are no rare or endangered species, or critical habitat in the project area.

8. Air quality, ambient noise levels and water quality will not be adversely affected. The Proposed Action will not violate State or National Ambient Air Quality Standards. Significant amounts of greenhouse gases will not be generated and refrigerants will be recovered. Noise levels during construction and operation will be within allowable standards. Existing water supply and water/wastewater infrastructure can accommodate the project and no impact to water quality is expected from stormwater runoff.

9. Environmentally sensitive areas will not be affected by the Proposed Action. There are no environmentally sensitive areas, such as floodplains, erosion-prone areas or geologically hazardous land at the project site.

10. The Proposed Action will not substantially increase energy consumption.

4.0 Finding of No Significant Impact

Based on the findings of the Environmental Assessment (EA), the Proposed Action would have no significant impacts to human health or the natural environment. Therefore, issuance of a Finding of No Significant Impact (FONSI) is warranted and preparation of an Environmental Impact Statement (EIS), pursuant to the National Environmental Policy Act of 1969 (Public Law 91-190) is not required.

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The USAF determined that the installation of a new JETC at Edwards AFB, California will have no significant impact on the human environment. This FONSI is based on the attached EA which has been independently evaluated by the USAF and determined to adequately and accurately address the need, environmental issues and impacts of the Proposed Action and appropriate mitigation measures. It provides sufficient evidence and analysis for determining that an EIS is not required. The USAF takes full responsibility for the accuracy, scope and content of the attached EA.

412 TW/PA
Attn: Mr. Gary Hatch
305 East Popson Avenue
Edwards AFB CA 93524-8060
(661) 277-8707

James E. Judkins

JAMES E. JUDKINS, NH-IV
Base Civil Engineer

13 Sep 12
Date

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COVER SHEET

ENVIRONMENTAL ASSESSMENT FOR INSTALLATION OF A NEW JET ENGINE TEST CELL EDWARDS AIR FORCE BASE, CALIFORNIA

a. Lead Agency: U.S. Air Force

b. Cooperating Agency: None

c. Proposed Action: Install a new Jet Engine Test Cell at Edwards Air Force Base

d. Inquiries on this document should be directed to the 95th Test Wing Public Affairs, Attn: Gary Hatch, 305 East Popson Avenue, Edwards Air Force Base, California 93524-8060, (661) 277-8707 or e-mail: gary.hatch@edwards.af.mil.

e. Designation: Final Environmental Assessment (EA)

f. Abstract: Pursuant to the *National Environmental Policy Act of 1969*, this EA has been prepared to analyze the potential environmental consequences of the proposed action and provide an environmental baseline for installation of a new jet engine test cell. Edwards Air Force Base (AFB), California, proposes to install a new 35,000 square feet JETC facility with 15,000 square feet storage barn at Edwards AFB. The new facility would be located on the Main Base near the existing maintenance facility (Building 3810). The new JETC facility would include a total of three test cells, with one cell capable of testing 150,000 pound thrust class engines, another cell capable of testing 100,000 pound multi-vectoring thrust class engines and a third cell capable of running 100,000 pound thrust class engines. In addition to the new JETC facility, Edwards AFB is also proposing to construct a 15,000 square foot storage barn. The existing JETC at Building 3804 would remain operational for testing of small jet engines. Adherence to all applicable federal, state, and local laws and regulations, and Air Force Instructions would ensure no significant environmental impact would occur as a result of this project.

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LIST OF ABBREVIATIONS AND ACRONYMS

AAQS	Ambient Air Quality Standards
AB	Assembly Bill
ACCS	accumulation site
AF	Air Force
AFB	Air Force Base
AFCEE	Air Force Center for Engineering and the Environment
AFTC	Air Force Test Center
AFFTC	Air Force Flight Test Center
AFFTCI	Air Force Flight Test Center Instruction
AFI	Air Force Instruction
AFPD	Air Force Policy Directive
AFRL	Air Force Research Laboratory
AFTPS	Air Force Test Pilot School
AICUZ	Air Installation Compatible Use Zone
ARB	California Air Resources Board
ARPA	Archaeological Resources Protection Act
ATC	Authority to Construct
AVEK	Antelope Valley East Kern
BACT	Best Available Control Technology
BCE	Base Civil Engineer
bgs	below ground surface
BHPO	Base Historic Preservation Officer
BMP	best management plan
^{o}C	degrees Celsius
CAA	Clean Air Act
CAAA-90	Clean Air Act Amendments of 1990
Cal –EPA	California Environmental Protection Agency
CATEX	Categorical Exclusion
CCR	California Code of Regulations
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CH_4	Methane
CIRF	Centralized Intermediate Repair Facility
CNEL	Community Noise Equivalent Level
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CWA	Clean Water Act
CY	calendar year

dB	decibel
dBA	decibel, A-weighted
DNL	day-night average sound level
DoD	Department of Defense
DoDD	Department of Defense Directive
DOPAA	Description of Proposed Action and Alternatives
DOT	Department of Transportation
EA	Environmental Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EISA	Energy Independence and Security Act
EKAPCD	Eastern Kern Air Pollution Control District
EPA	United States Environmental Protection Agency
ERP	Environmental Restoration Program
Est	Estimated
^{o}F	degrees Fahrenheit
FFCA	Federal Facility Compliance Act
FONSI	Finding of No Significant Impact
GHG	Greenhouse Gas
gpm	gallons per minute
HAP	hazardous air pollutant
HMC	Hazardous Materials Cell
HMDSC	Hazardous Materials Distribution Support Centers
HMMP	Hazardous Materials Management Plan
HMP	Hazardous Materials Pharmacy
Hr	Hour
HWMP	Hazardous Waste Management Plan
HWSF	Hazardous Waste Support Facility
IAP	initial accumulation point
ICRMP	Integrated Cultural Resources Management Plan
JETC	Jet Engine Test Cell
kHz	kilo Hertz
L_{eq}	Equivalent Sound Level
MACT	maximum achievable control technology
MFH	Military Family Housing
mgd	million gallons per day

mg/m^3	milligrams per cubic meter
MMBtu/hr	million British thermal units per hour
mph	miles per hour
MR	Central Base Management Region
MRR	Mandatory Reporting Rule
MRTFB	Major Range Test Facility Base
MSDS	Material Safety Data Sheet
MT	Metric Tons
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
Natl	National
ND	Negative Declaration
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standard for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NO_x	oxides of nitrogen
NO_2	nitrogen dioxide
N_2O	Nitrous Oxide
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSR	New Source Review
O_3	ozone
OU	Operable Unit
Pb	Lead
PM	particulate matter
PM_{10}	particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
ppb	parts per billion
ppm	parts per million
PSD	Prevention of Significant Deterioration
PTE	potential to emit
PTO	Permit to Operate
RCNM	Roadway Construction Noise Model
RCRA	Resource Conservation and Recovery Act
RDT&E	research, design, testing and evaluation
RNI	Repair Network Infrastructure
RWQCB	Regional Water Quality Control Board
SCAQMD	South Coast Air Quality Management District
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_x	oxides of sulfur

SO_2	sulfur dioxide
SSPE	Stationary Source Potential to Emit
STP	Special Test Programs Office
Std	Standard
SWPPP	Stormwater Pollution Prevention Plan
TCE	trichloroethylene
USAF	United States Air Force
USC	United States Code
VI	Vapor Intrusion
VOC	volatile organic compound
WWTP	wastewater treatment plant
$\mu g/m^3$	micrograms per cubic meter
$\mu N/m^2$	Micro Newtons per square meter
µPa	Micro Pascals

1.0 INTRODUCTION

1.1 Background

Edwards AFB develops new weapons systems, including jet engines, for the United States Air Force. These jet engines require regular maintenance and testing in order to ensure proper performance. Effective testing early on in the development of aircraft engines is critical to the acquisition of effective war fighter systems. Currently, jet engines tested and maintained include the F100-PW-100/200/220/229, F110-GE-100/129, F101-GE-102, F118-GE-100, F404-GE-400, J85-GE-5H and TF33-P-5, TF33-P-102. Future testing proposed with this action include TF33-P-103 engines (B-52 aircraft), F119-PW-100 (F-22 aircraft), F135-PW-100 engines for the Joint Strike Fighter Program, F108-CF-100 (KC-135R), F117-PW-100 (C-32A) and the F103-GE-100 (KC-10A). Cargo/Tanker and future jet engine variants that are not in production as of this date may also be tested at the facility in the future and are not part of this environmental assessment.

1.2 Purpose and Need

The purpose of the proposed action is to construct a new jet engine test cell or refurbish the existing test cell to support legacy and new generation jet engines.

The existing Jet Engine Test Cell (JETC) facility, built in 1958, was designed for smaller, less powerful engines and is not capable of adequately testing modern jet engines without a major facility infrastructure upgrade. In addition to major facility infrastructure and structural problems resulting in over 2.6 million dollars in repairs, the facility is having difficulty meeting Kern County environmental requirements for double-walled wastewater piping. This JETC facility will soon be functionally and structurally obsolete. Furthermore, the Department of Defense (DoD) is proposing the addition of the Centralized Intermediate Repair Facility (CIRF) requirement at Edwards AFB. This CIRF requirement cannot be adequately supported using the existing JETC facility. In order to provide intermediate and depot level jet engine maintenance on all assigned aircraft at the Air Force Test Center (AFTC), a JETC facility with one cell capable of testing 150,000 pound thrust class engines, another cell capable of testing 100,000 pound multi-vectoring thrust class engines and a third cell capable of running 100,000 pound thrust class engines is required at Edwards AFB.

1.3 Location and Scope of the Proposed Action

Edwards AFB is located in the Antelope Valley region of the western Mojave Desert in Southern California. It is about 60 miles northeast of Los Angeles, California. The Base occupies an area of approximately 308,000 acres or 470 square miles. Portions of the Base lie within Kern, Los Angeles and San Bernardino Counties. Figures 1-1 and 1-2 provide the geographic location of Edwards AFB and the proposed JETC site.

The proposed action would be located in the ***Main Base*** portion of Edwards AFB, within the Propulsion Flight Complex, which is bordered by North Wolfe Avenue to the east and Gregorius Avenue to the west. The complex includes Buildings 3800, 3801, 3802, 3804, 3808, 3809 and 3810. The new JETC facility would be located near to Building 3810 (see Figure 1-3) which is currently used for maintenance and within proximity to the existing JETC facility (Building 3804).

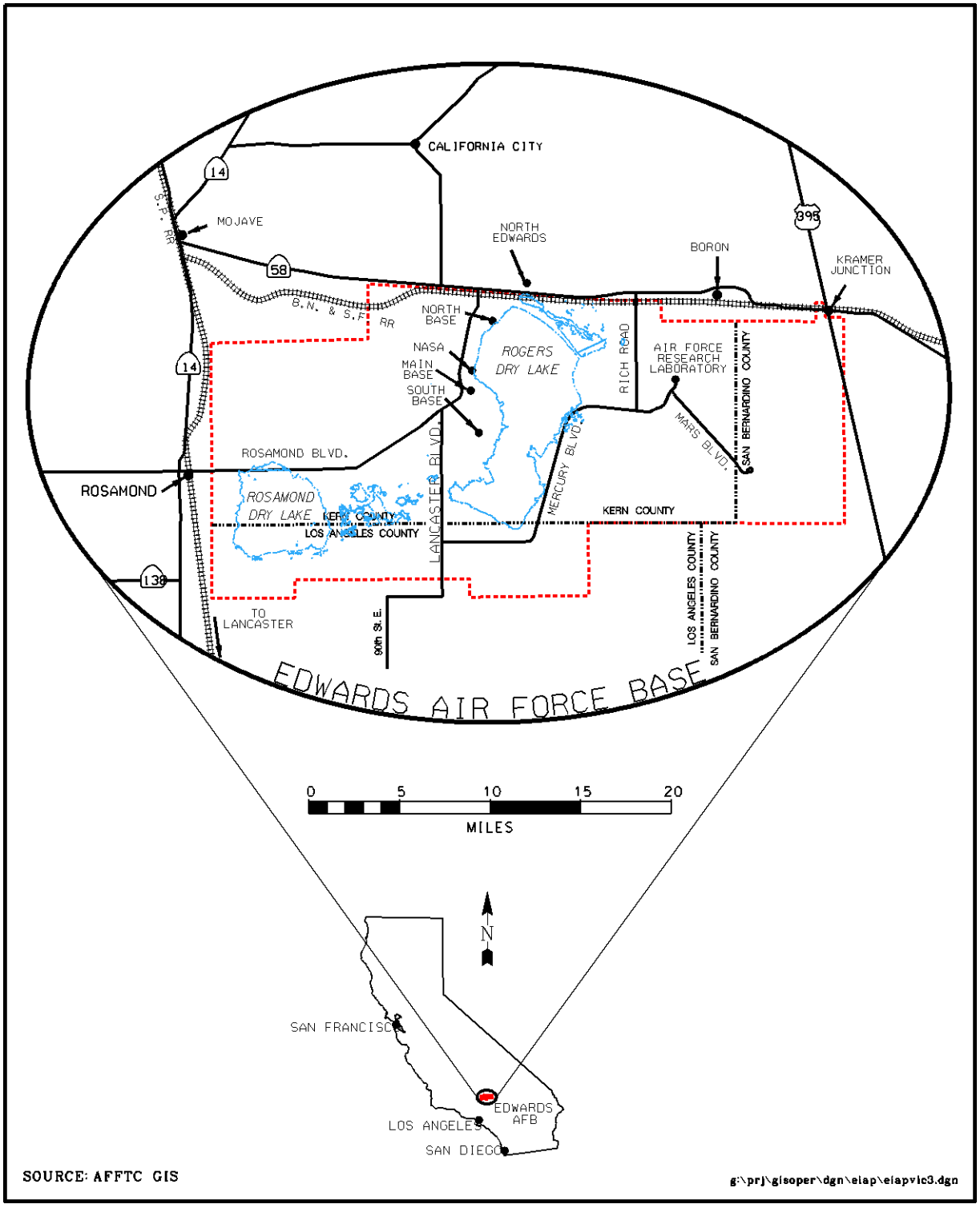


Figure 1-1. Geographic Location of Edwards AFB

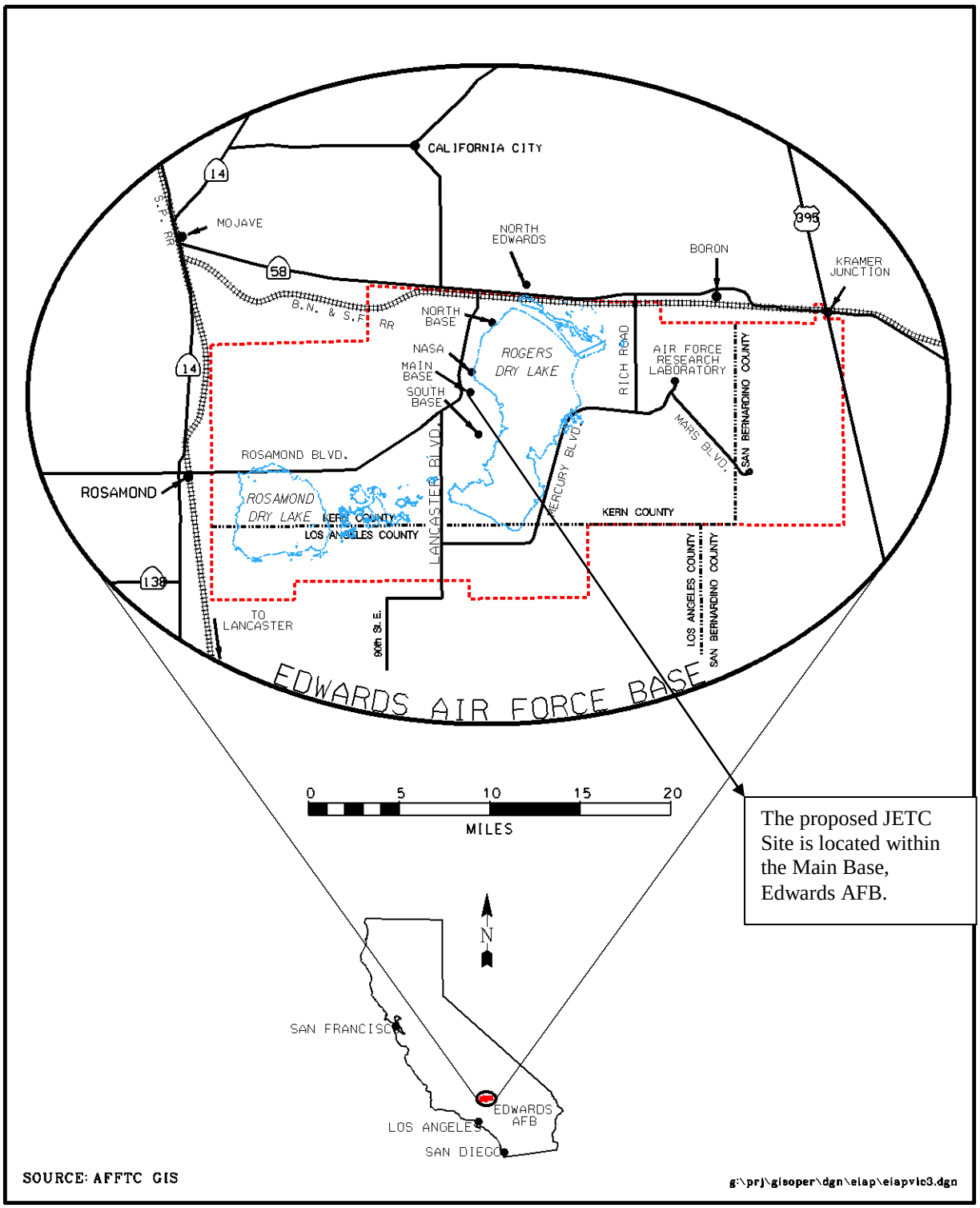


Figure 1-2. Geographic Location of the Proposed JETC, Edwards AFB

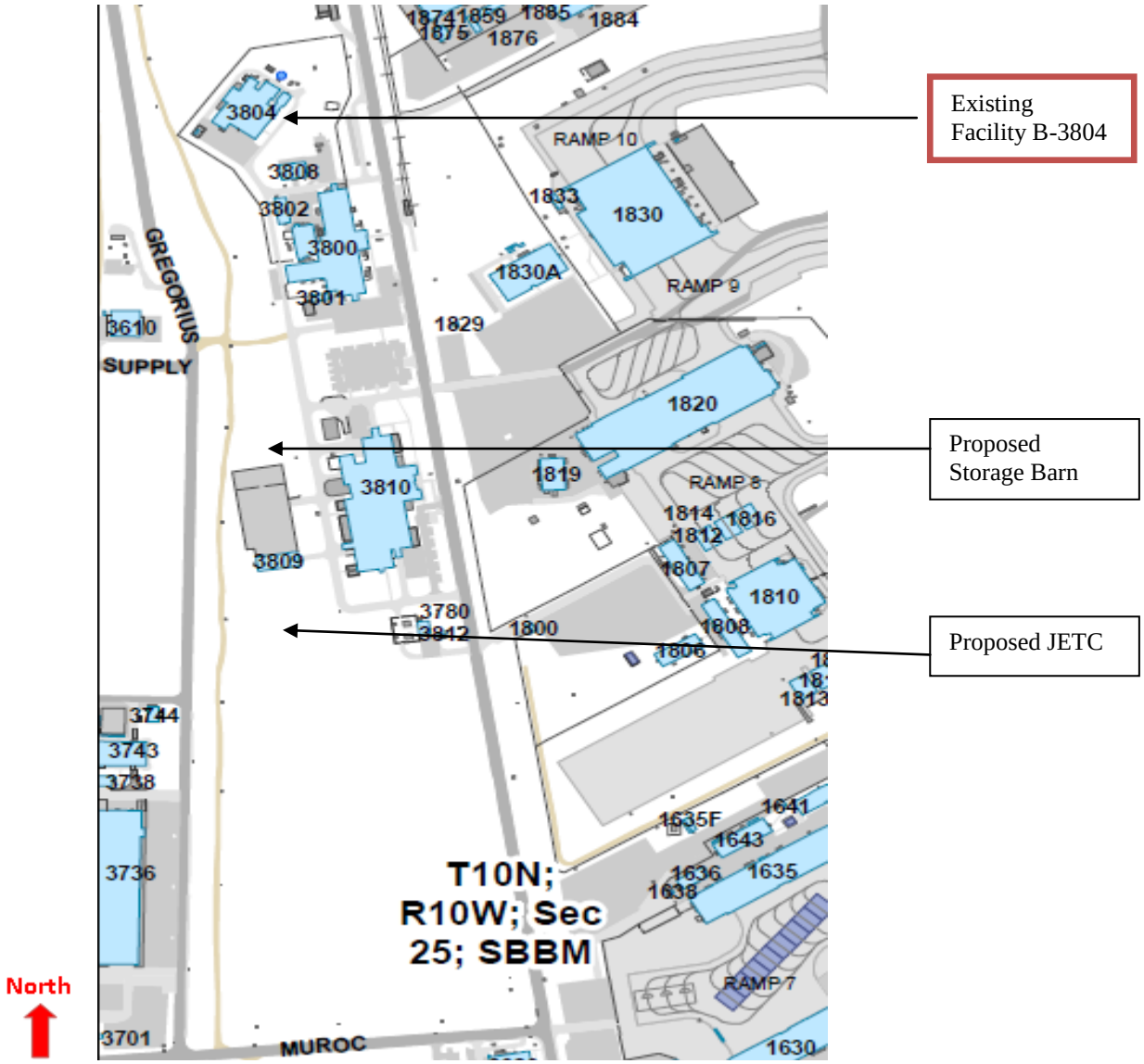


Figure 1-3. Project Site Location Map, Main Base, Edwards AFB

The proposed action would construct an approximately 35,000 square-foot building and a new 15,000 square-foot storage barn requiring approximately 0.5 acres of ground disturbance.

1.4 Issues and Concerns

1.4.1 Issues and Concerns Studied in Detail

During the initial review process, the following issues and concerns were identified as requiring assessment when considering the potential environmental impacts of the alternatives:

- ***Air Quality –*** Edwards AFB is located in the Mojave Desert Air Basin, which occupies portions of Kern, Los Angeles, San Bernardino and Riverside Counties. The proposed project is in Kern County and is subject to the requirements of the Eastern Kern Air Pollution Control District (EKAPCD). This Environmental Assessment (EA) will determine whether emissions from the operation of the new JETC facility conform to federal, state and local requirements of the EKAPCD, Air Force Instruction (AFI) 32-7040, Air Quality Compliance and Resource Management and with Air Force Materiel Command Standard Operating Procedure for Air Quality Stationary Source Management.
- ***Noise –*** According to the Edwards AFB 2011 General Plan, Edwards AFB conducted an Aircraft Noise Study in February 2010 that analyzed the potential noise effects related to current and future Base operations. AFI 32-7063, *Air Installation Compatible Use Zone (AICUZ) Program*, exempts Edwards AFB from AICUZ Program requirements if current aircraft noise contours do not extend beyond the Base boundaries. The EA will analyze whether the additional testing of the F-35 engines is included in the noise contours established for Edwards AFB.
- ***Water Resources –*** There are no jurisdictional wetlands, permanent naturally occurring lakes or perennial streams within the boundaries of Edwards AFB. Runoff from the proposed project would not discharge to waters of the United States. The proposed Project will not generate stormwater runoff or water quality impacts. However, Section 438 of the Energy Independence and Security Act (EISA) requires all federal development projects with a footprint that exceeds 5,000 square feet conform with federal stormwater design requirements to maintain the pre-development hydrology and protect downstream receiving waters.
- ***Hazardous Materials and Waste –*** According to the Edwards AFB General Plan, dated 2011, the Propulsion Flight Complex has been identified as having subsurface soil and/or groundwater contamination. The EA discusses potential adverse effects of the contamination to the proposed project and includes mitigation measures to reduce significant adverse effects.
- ***Cultural Resources*** – The proposed project site is located in a low sensitive area for cultural resources according to the Edwards AFB General Plan, dated 2011 and the Integrated Cultural Resources Management Plan (ICRMP). However, the proposed project site is located adjacent to Building 3804, an eligible historic resource. Potential adverse impacts to this historic resource from the construction of the new JETC facility will be analyzed in this EA.

1.4.2 Issues and Concerns Eliminated From Detailed Study

The following issues and concerns were initially considered, but subsequently eliminated from further consideration in this EA:

- ***Land Use –*** The proposed project is not anticipated to result in adverse effects to land uses at Edwards AFB. The proposed project occurs within the Propulsion Flight Complex of the Main Base and contains similar land uses and includes an existing JETC facility.

- ***Safety and Occupational Health –*** The construction and operational activities related to the new JETC facility would comply with the safety standards developed by the Occupational Safety and Health Administration. All safety and occupational health guidelines and practices established by Edwards AFB will be followed by personnel. Therefore, no adverse effects to safety and occupational health are anticipated.
- ***Biological Resources –*** Edwards AFB contains two resident species that are listed as threatened or endangered under the federal or state Endangered Species Act: the desert tortoise and the Mohave ground squirrel. According to the Edwards AFB General Plan, dated 2011, the Main Base area contains the lowest density levels of desert tortoise. The proposed project area does not contain critical habitat for the desert tortoise. Also, there is no presence of the Mohave ground squirrel in the project area. Furthermore, the new JETC facility would be constructed on land that is previously disturbed. Therefore, no adverse effects to biological resources are anticipated.
- ***Geology and Soils –*** The new JETC facility would be constructed on previously disturbed land that is currently vacant within the Main Base of Edwards AFB. The project area is surrounded by similar land uses. Construction of the facility would not involve ground disturbance beyond 1.5 acres or beyond a depth of 10 feet. Thus, adverse effects to geology and soils are not anticipated.
- ***Socioeconomics –*** The proposed project involves the construction of an approximately 35,000 square foot facility and an approximately 15,000 square foot storage barn on previously disturbed land surrounded by similar land uses. No residential land uses would be impacted by the proposed project. The addition of a new JETC facility would not significantly affect population, fiscal growth, employment or housing in the project area. Thus, no adverse effects to the socioeconomic condition of the project area are anticipated. Some beneficial effects could be expected from short-term construction jobs.
- ***Airspace –*** The construction and operation of a new JETC facility would not impact airspace at Edwards AFB. No adverse effects are anticipated.
- ***Infrastructure –*** The proposed project would not result in adverse effects to the existing infrastructure at Edwards AFB. Adequate infrastructure exists within the Propulsion Flight Complex to support the operation of a new JETC facility.
- ***Energy Resources –*** The new JETC facility would meet Leadership in Energy and Environmental Design certification requirements. In addition, the proposed location for the new JETC facility would maximize the Base efficiencies for testing of jet engines. Adverse impacts to energy resources are not anticipated.
- ***Public/Emergency Services –*** The proposed project would be constructed within the Propulsion Flight Complex, which includes an existing JETC facility and other associated uses. Access to the new JETC facility would be provided from existing roads within the complex. The proposed project does not include the construction of new roads. Construction and operation of the project would not obstruct or impact public/emergency services within Edwards AFB. No adverse effects are anticipated.

1.5 Decision to Be Made

The decision to be made is whether to construct a new JETC facility, upgrade the existing JETC facility or continue to utilize the existing JETC facility for smaller jet engine testing without upgrades. Larger jet engines would be tested at an off-base location. These options will be further detailed in Chapter 2, Description of Proposed Action and Alternatives, of this EA.

1.6 Regulatory Requirements, Permits and Approvals

1.6.1 Regulatory Requirements

This EA has been prepared in order to comply with the National Environmental Policy Act (NEPA) of 1969 and the Council on Environmental Quality (CEQ) regulations implementing NEPA. This document is intended to fulfill the requirements for compliance with Title 40 Code of Federal Regulations (CFR) Parts 1500-1508 and AFI 32-7061 (2 April 2010), *The Environmental Impact Analysis Process*.

1.6.2 Permits and Approvals

The proposed project will require permits and/or approvals from ***federal, state and local agencies*** depending upon the extent of the work proposed, type of equipment used, etc. The contractor performing the work is responsible for obtaining the relevant permits and accomplishing any required notifications. Environmental permitting requirements for all work on Base are coordinated through Environmental Management. The following permits would be required; but are subject to change as permit regulations and requirements change over time:

- ***Air Quality***
  - *An Authority to Construct (ATC) for construction of the JETC facility is required.*
  - *An air quality Permit to Operate (PTO) for the JETC facility is required.*
  - *A modification to the existing EKAPCD Title V federal operating permit for equipment operation at the proposed JETC facility is required.*
  - *An air quality notification to the EKAPCD for the removal of asbestos-containing material from any potential buildings demolitions or renovations is required.*
  - *Any boilers operated at the JETC facility with a capacity greater than 120 gallons require an air permit from the EKAPCD.*
- ***Water Resources***
  - *An AFFTC Form 5528, Industrial Wastewater Discharge Permit, must be obtained in the event that post-construction facility operations generate industrial wastewater requiring on-site disposal at the Main Base WWTP, rather than off-site disposal. The proponent/contractor shall be responsible for coordinating the permit.*
  - *The proposed project must comply with EAFBI 32-6, Edwards AFB Wastewater Instruction.*

- *Compliance with Section 438 of EISA for maintaining pre-development site hydrology.*

- ***Safety and Occupational Health***
  - *A digging permit (Air Force [AF] Form 103) is required.*
  - *A digging permit from the California Occupational Safety and Health Administration is required prior to digging trenches five or more feet in depth into which a worker is required to descend.*

- ***Hazardous Materials and Waste***
  - *A license request review (AF Form 3952) would be required for the proposed use of the Hazardous Materials Pharmacy (HMP).*

- ***Cultural Resources***
  - *Formal consultation with the Advisory Council on Historic Preservation and/or the California State Historic Preservation Office (SHPO) pursuant to Section 106 of the National Historic Preservation Act (NHPA), as amended (16 United States Code [USC] 470 et seq.) may be required.*

1.7 Related Environmental Documents

A number of related environmental documents have been prepared and approved that address activities within Edwards AFB. These documents contain information used in the preparation of this EA. A listing of these documents is detailed in Chapter 5, References.

1.8 Draft EA Public Notification Process

This Draft Final EA is being made available for agency and public comment with a 15-day review period. Due to the remote location of the proposed project, the comment period is being limited to Edwards AFB with copies available for review at the Base Library, on-line at the Edwards AFB website at *https://eafb.mojavedata.gov/SitePages/Home.aspx* and to those individuals who request copies. Public Notification will be published in the Edwards AFB newspaper the "Desert Wings". At the close of the public review period, an Appendix B will be installed annotating the date of the public review, any comments from the public and the responses to those comments.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This chapter presents the Description of the proposed action and Alternatives (DOPAA) for the new JETC facility at Edwards AFB. Section 2.1 describes Alternative A – New 35,000 Square Foot Engine Test Cell Facility Adjacent to Existing Facility, Building 3810 and a new 15,000 square-foot storage barn, which is the proposed action. Section 2.2 discusses Alternative B – Upgrading/Repairing the Existing JETC Facility. Section 2.3 provides Alternative C – No Action Alternative. Section 2.4 includes Criteria for Selection of a Reasonable Range of Alternatives. Section 2.5 discusses the Alternatives Considered but Dismissed from Further Consideration. Section 2.6 provides a Comparison Summary of Alternatives.

Currently, jet engines tested and maintained include the F100-PW-100/200/220/229, F110-GE-100/129, F101-GE-102, F118-GE-100, F404-GE-400, J85-GE-5H and TF33-P-5, TF33-P-102. Future testing proposed with this action include TF33-P-103 engines (B-52 aircraft), F119-PW-100 (F-22 aircraft), F135-PW-100 engines for the Joint Strike Fighter Program, F108-CF-100 (KC-135R), F117-PW-100 (C-32A) and the F103-GE-100 (KC-10A). Cargo/Tanker and future jet engine variants that are not in production as of this date may also be tested at the facility in the future and are not part of this environmental assessment.

2.1 Alternative A – New 35,000 Square Foot Engine Test Cell Facility Adjacent to Existing Facility, Building 3810

Alternative A, located adjacent to existing facility Building 3810, involves the construction of a new JETC facility located within the Main Base of Edwards AFB on a site that is considered previously disturbed. This site is currently vacant and consists of dirt and native vegetation. Figure 2-1 shows the project site location for Alternative A.

Alternative A consists of the construction an approximately 35,000 square-foot building and a new 15,000 square-foot storage barn requiring approximately 0.5 acres of ground disturbance. The 35,000 square-foot building supports a new, modern JETC facility that supports the current workload of legacy, new generation jet, thrust vector, supersonic combustion ramjet Jet and possible fluidic engines. The new approximately 35,000 square foot JETC facility would include the associated infrastructure for three new test cells. One of the test cells would be designed to test heavy aircraft engines with up to 150,000 pounds of thrust. The remaining two test cells would be designed to test fighter size engines with up to 100,000 pounds of thrust. The new JETC facility would also contain adequate areas for administration, laboratories, a computer data system, storage and engine readiness areas.

Construction of a 15,000 square-foot storage barn is planned within the project area located north of the new JETC and Building 3809. It is a single story structure for storing or staging equipment prior to testing. The existing JETC facility would not be demolished, but retained for small engine testing. Alternative A would be located near Building 3810 and within close proximity to the existing JETC facility, which allows for efficient access and use of the existing JETC and maintenance facilities. Alternative A is situated above a hazardous groundwater plume and would require the installation of an impermeable barrier between the plume and building foundation in order to mitigate the potential for subsurface contaminant vapor intrusion.

Proximity to the flightline, the existing maintenance facility (Building 3810) and the existing JETC facility enables timely testing and return of the engines to service. Implementation of Alternative A allows Edwards AFB to properly test all current engines without delays resulting from shipping engines to and from an off-base test facility. Prior to actual site construction, other Edwards AFB buildings will be analyzed for demolition to serve as square footage offset per Air Force policy. A firm list of buildings for square footage offset has yet to be developed. Currently, any buildings planned for demolition at Edwards AFB are being analyzed through a comprehensive Building Demolition EA that is under development and expected to be completed in 2012.

Future testing proposed with this action include TF33-P-103 engines (B-52 aircraft), F119-PW-100 (F-22 aircraft), F135-PW-100 engines for the Joint Strike Fighter Program, F108-CF-100 (KC-135R), F117-PW-100 (C-32A) and the F103-GE-100 (KC-10A).

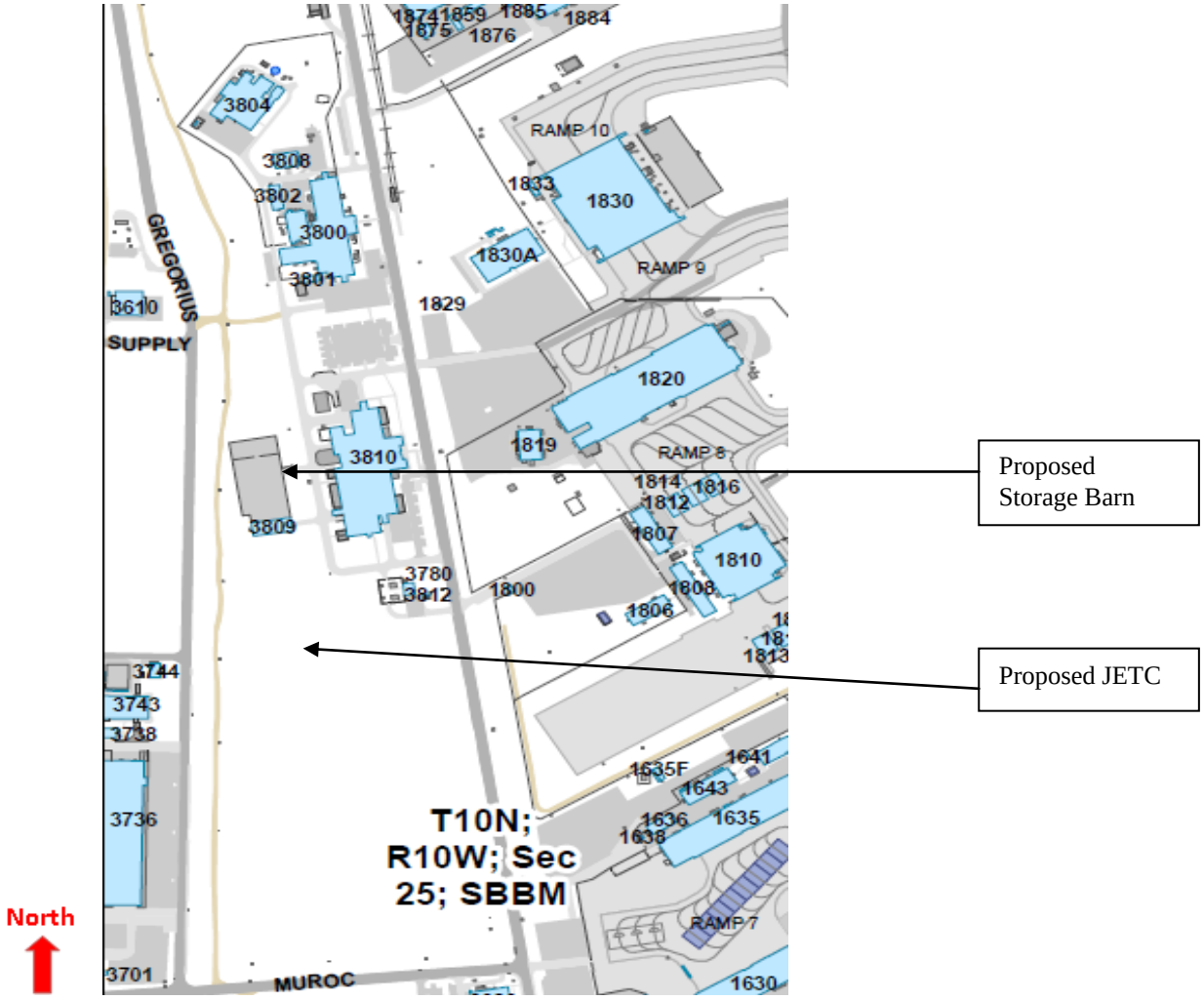


Figure 2-1. Project Site Location Map for Alternative A

2.2 Alternative B – Upgrading/Repairing the Existing JETC Facility

Under Alternative B, the existing JETC facility (Building 3804) would undergo extensive repairs and modifications to upgrade the facility. The water augmentation, heating ventilation and air conditioning and electrical systems within the existing facility are obsolete and inadequate and the existing facility is having difficulty meeting Kern County environmental requirements for double-walled wastewater piping. The vibration and power of the engines have compromised the structural integrity of the concrete foundation. Previous repairs and modifications have been performed on the building; however, these repairs are temporary fixes and continuous workarounds are required in order to keep the facility operational. Additionally, the existing facility does not have adequate storage space for equipment needed to support the new jet engines.

The existing JETC facility is sited on a hazardous plume. In order to mitigate the potential for subsurface contaminant vapor intrusion, the installation of extraction wells and treatment system for the air contaminant may need to be constructed around the facility. Currently, the number and size of the extraction wells and type of vapor controls, if any, have not been assessed.

Despite the proposed upgrade and repairs to the existing JETC facility, the facility would remain structurally inadequate to support testing of heavy aircraft engines or thrust vector engines. Off-base testing would likely be required if Alternative B is implemented. Thus, this alternative would not meet the AFTC Mission at Edwards AFB. Figure 2-2 shows the project site location for Alternative B.

Future testing proposed with this action include TF33-P-103 engines (B-52 aircraft), F119-PW-100 (F-22 aircraft), F135-PW-100 engines for the Joint Strike Fighter Program, F108-CF-100 (KC-135R), F117-PW-100 (C-32A) and the F103-GE-100 (KC-10A).

2.3 Alternative C – No Action Alternative

Under Alternative C, the existing 33,000 square foot JETC facility would remain operational and continue to be utilized for smaller jet engine testing. Testing for larger jet engines would have to occur at an off-base testing facility. Due to design limitations and use, the existing facility would not be structurally adequate for the testing of heavy aircraft engines or thrust vector engines.

With Alternative C, the existing JETC facility would be unable to adequately test new engines. The existing facility will continue to deteriorate, fall behind engine technology and result in continuous and costly workarounds in order to keep the facility in operation. Furthermore, the existing facility is unable to support the AFTC or other Air Force missions at Edwards AFB by allowing engines to be effectively and efficiently tested without the delays resulting from shipping engines to and from an off-base testing facility. Figure 2-2 shows the project site location for Alternative C.

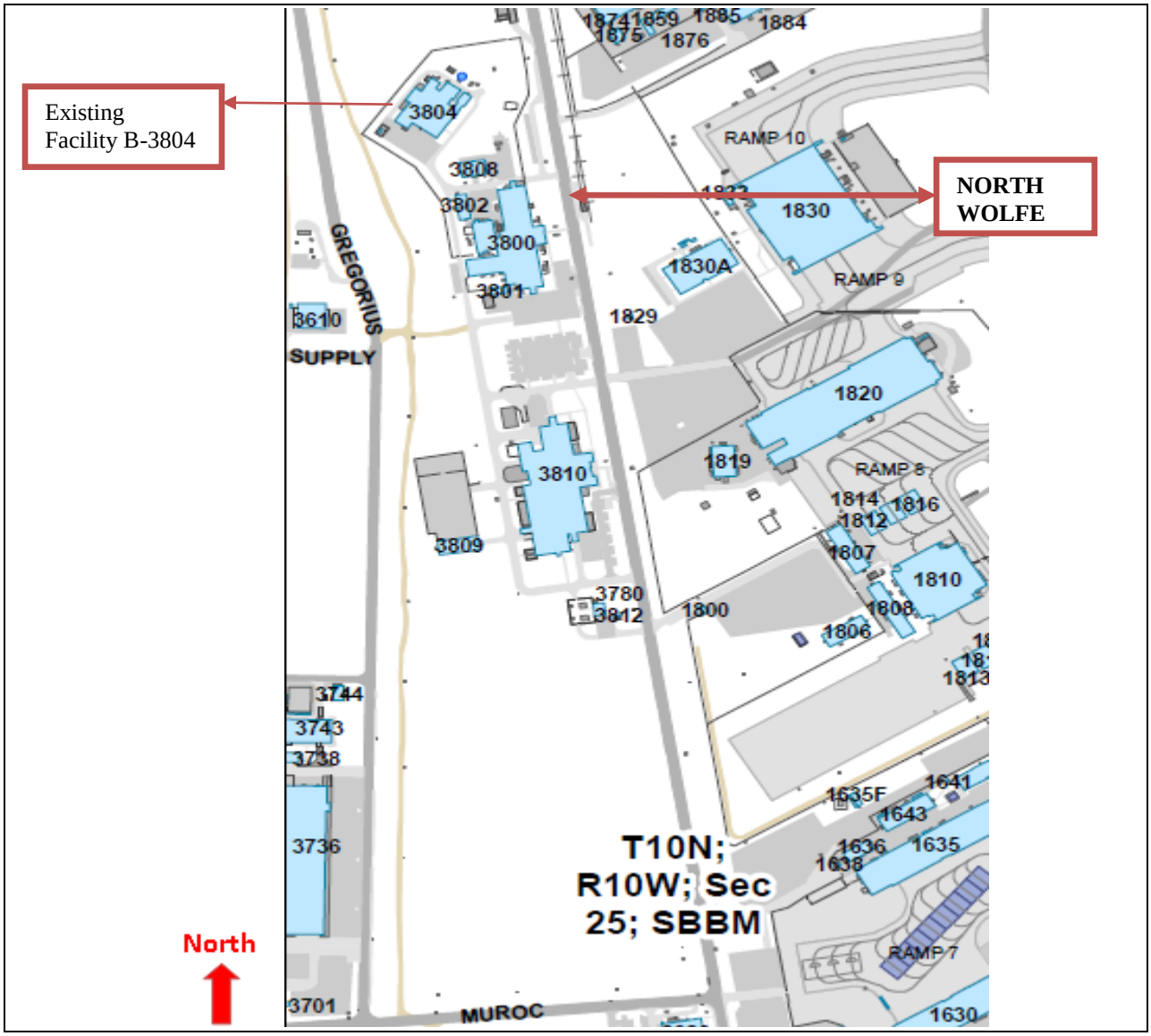


Figure 2-2. Project Site Location for Alternatives B and C

2.4 Selection Standard for a Reasonable Range of Alternatives

The criteria identified in this section establish a minimum set of requirements that must be met in order for an alternative to be considered viable. Alternatives meeting all selection criteria will be fully analyzed in the Environmental Consequences section of the EA.

The criteria used to select the alternatives discussed in this document are described below:

- ***Technical/Operational***

  1) The alternative must retain the ability to support the AFTC Mission at Edwards AFB.
  2) The alternative must remain compatible with the most current Edwards AFB General Plan (i.e., 2011).
  3) The alternative must continue to comply with existing AFIs and Executive Orders.
  4) The alternative must be in close proximity to the flightline, the existing JETC facility and the existing jet engine maintenance facility.

- ***Environmental***

  1) The alternative must continue to minimize the extent of environmental impacts.

- ***Economic***

  1) The alternative must promote operational efficiency as well as sustainability in the building design (e.g., Leadership in Energy and Environmental Design certified).

2.5 Alternatives Considered But Dismissed from Further Consideration

The following alternatives were initially considered, but subsequently eliminated from further consideration.

2.5.1 JETC Facility Located Off Site at Tinker AFB

This off-base alternative was qualitatively assessed and dismissed due to the following:

- Delays and increases in costs that result from shipping engines to and from an off-base testing facility;
- Potential damage to engines occurring during transport that could affect product quality;
- The ability to provide timely support to the Special Test Programs (STP) Office, the Air Force Test Pilot School (AFTPS), the Global Repair Network Infrastructure (RNI), AFTC Mission at Edwards AFB and the Major Range Test Facility Base (MRTFB);
- Additional air emissions resulting from the transport of engines;
- Cost of engine repair (e.g., labor rates) if damaged during transport; and
- Loss of potential new and existing jobs at Edwards AFB.

2.5.2 Off-Base Repair at a More Local/Southwest Regional Facility

This off-base alternative was qualitatively assessed and also dismissed due to the following:

- Delays and increases in costs that result from shipping engines to and from an off-base testing facility;
- Potential damage to engines occurring during transport that could affect product quality;
- The ability to provide timely support to the STP Office, the AFTPS, the Global RNI, AFTC Mission at Edwards AFB and the MRTFB;
- Additional air emissions resulting from the transport of engines;
- Cost of engine repair (e.g., labor rates) if damaged during transport; and
- Loss of potential new and existing jobs at Edwards AFB.

2.6 Comparison Summary of Alternatives

In order for jet engines to be effectively and efficiently tested, the new JETC facility must be located adjacent to or in close proximity to the flightline and the existing maintenance facility.

Table 2-1 provides a comparison summary of the project description and location for Alternative A – New 35,000 Square Foot Engine Test Cell Facility Adjacent to Existing Facility B3810, Alternative B – Upgrading/Repairing the Existing JETC Facility *and* Alternative C – No Action Alternative.

Table 2-2 provides a preliminary qualitative comparison of the potential environmental impacts of the Alternatives, including the proposed action (Alternative A) and the No Action Alternative (Alternative C). No significant adverse impacts are anticipated for the proposed action. A detailed analysis quantifying the potential environmental impacts is provided in Chapter 4 of this EA.

Table 2-1. Comparison of Alternatives

	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
Title	*New Engine Test Cell Facility Adjacent to Existing Facility Building 3810 with a new storage barn*	*Upgrading/Repairing the Existing JETC Facility*	*No Action Alternative*
Location	*Adjacent to B3810 and south of Building 3804 (existing JETC facility), Main Base*	*Building 3804, Main Base*	*Building 3804, Main Base*
Size	*35,000 Square Feet JETC* *15,000 storage barn*	*33,000 Square Feet*	*33,000 Square Feet*

Table 2-2. Summary of the Potential Environmental Impacts(1)

ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
Land Use	No Impact	No Impact	No Impact
Air Quality	Likely Impact	Likely Impact	No Impact
Wastewater	Possible Impact	Possible Impact	Likely Impact
Surface Water and Groundwater	Possible Impact	Possible Impact	No Impact
Toxic/Hazardous Materials/Waste	Possible Impact	Possible Impact	No Impact
Solid Waste	Possible Impact	Possible Impact	No Impact
Noise	Possible Impact	Possible Impact	No Impact
Biological Resources	No Impact	No Impact	No Impact
Geology/Soils	No Impact	No Impact	No Impact
Cultural Resources	Possible Impact	Possible Impact	No Impact
Energy	No Impact	No Impact	No Impact
Socioeconomics	No Impact	No Impact	No Impact
Transportation	No Impact	No Impact	Possible Impact

Note: (1) An impact may be either beneficial or adverse.

3.0 AFFECTED ENVIRONMENT

This section describes the relevant resources at Edwards AFB that may impact or be impacted by any of the action alternatives if implemented. This chapter establishes the baseline against which the decision maker and the public can compare the effects of all action alternatives. Based on a review of the Edwards AFB General Plan, dated 2011 and analysis of other relevant environmental and technical information, it is reasonable to conclude that the proposed action is not expected to result in any direct, indirect, or cumulatively adverse effects to the following resources:

- Land Use
- Safety and Occupational Health
- Biological Resources
- Geology and Soils
- Socioeconomics
- Airspace
- Infrastructure
- Energy Resources
- Public/Emergency Services

A brief explanation for each of the above-listed resources is provided in Section 1.3.2.

The following sections describe the existing environment as related to Air Quality, Noise, Water Resources, Hazardous Materials and Waste and Cultural Resources.

3.1 Air Quality

3.1.1 Regulatory Requirements

Air quality for any particular region is defined by the amount of air pollutants compared to a federal or state air quality standard. Ambient air quality is affected by a variety of human or anthropogenic activities as well as by naturally occurring or biogenic sources (such as windblown dust). Primary sources of air pollution from anthropogenic activity include stationary sources (e.g., boilers, internal combustion engines and paint spray booths) and mobile sources (e.g., cars, trucks, buses and airplanes). The United States Environmental Protection Agency (EPA) identified a group of criteria pollutants that affect ambient air quality and can injure human health, harm the environment and cause property damage. These criteria pollutants include carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM) less than or equal to 10 microns in diameter (PM_{10}), PM less than or equal to 2.5 microns in diameter ($PM_{2.5}$) and sulfur dioxide (SO_2). These criteria pollutants are monitored by the EPA, the California Air Resource Board (ARB) and by the EKAPCD.

The 1970 federal Clean Air Act (CAA) provides the principal framework for national, state and local efforts to protect and enhance air quality. Under the CAA Amendments of 1990 (CAAA-90), EPA established National Ambient Air Quality Standards (NAAQS) for the criteria pollutants. The NAAQS define clean air and are established to protect even the most sensitive individuals in our communities. An air quality standard defines the maximum amount of a pollutant that can be present in outdoor air without harm to the public's health.

The CAA and the CAAA-90 provided the legal framework to develop regulations controlling air pollution emissions from stationary and mobile sources in order to protect public health and welfare. Air quality regulations were first promulgated with the CAA and revised with the CAAA-90. Stationary sources at Edwards AFB typically include fixed sources such as generators powered by internal combustion engines, external combustion boilers, JETCs and spray paint booths. Mobile sources typically include motor vehicles, construction equipment, portable equipment and aircraft.

3.1.2 National and State Ambient Air Quality Standards

The CAA and CAAA-90 established the NAAQS for the regulation of criteria pollutants. The ARB and the EKAPCD have the primary authority and responsibility to implement rules and regulations to control sources of criteria pollutants. The criteria pollutants include carbon monoxide, sulfur dioxide, ozone, nitrogen dioxide, particulate matter equal to or less than 2.5 microns in diameter, particulate matter equal to or less than 10 microns in diameter and lead. (CO, SO_2, O_3, NO_2, $PM_{2.5}$, PM_{10} and Pb). In addition, volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) pollutants are classified as O_3 precursors and subject to further regulations.

Based on measured ambient criteria pollutant data, the EPA designates areas as attainment (good air quality) or nonattainment (poor air quality). An area is often designated as unclassified when there are insufficient ambient criteria pollutant data for the EPA to form a basis for attainment status. Once an area is classified as nonattainment, the degree of nonattainment is divided into separate categories such as marginal, moderate, serious, severe or extreme. The assignment of a nonattainment category is based on measured criteria pollutant concentrations in a given location and varies according to the criteria pollutant of concern.

The ARB monitors ambient air quality by installing and maintaining instruments to measure the level of pollution in the ambient environment in areas that are expected to exceed the standard. Many of the monitoring instruments measure the level of pollutant and these concentrations are averaged over the appropriate timeframe to verify compliance with the NAAQS. The measurement of existing ambient criteria pollutant concentrations is accomplished using air quality monitoring stations. The closest ARB air quality monitoring station to Edwards AFB is located in Mojave, California, approximately 25 miles away.[1]

The CAAA-90 established both primary and secondary limits for the goal of improving ambient air quality. These limits are considered the maximum pollutant concentrations for criteria pollutants found in a region without jeopardizing human health or the environment. The primary

[1] 923 Poole Street, Mojave, California 93501

standard is established to protect public health and the secondary standard is intended to prevent environmental and property damage.

States are also required to develop a State Implementation Plan (SIP) that sets forth how the CAAA-90 provisions will be implemented. The SIP is the primary means for the implementation, maintenance and enforcement of the measures required to attain and maintain the NAAQS. The purpose of the SIP is twofold. First, it must provide a control strategy that result in the attainment and maintenance of the NAAQS. Second, it must demonstrate that progress is made in attaining the standards in each nonattainment area. Within the State of California, the authority to regulate sources of air emissions resides with the ARB and is delegated to local air pollution control and air quality management districts. Local districts enact rules and regulations to achieve SIP requirements. On 9 January 2003, the EKAPCD adopted the East Kern Ozone Attainment Demonstration, Maintenance Plan and Redesignation Request for the East Kern County nonattainment area. On 1 May 2003, the EKAPCD Board adopted amendments to the January 2003 plan. On 9 December 2003, ARB adopted and submitted the amended plan to EPA.[2]

While the EPA sets national standards for air quality in the form of NAAQS, California law authorizes the ARB to set ambient (outdoor) air pollution standards (California Health & Safety Code, Section 39606) in consideration of public health, safety and welfare. The CAAA-90 recognized that states should take the lead on protecting air quality at the local level because pollution control problems typically require knowledge of local conditions, industry and geography. The state-specific standards may be more stringent than EPA standards, but cannot be less stringent and are enforceable under federal law once approved by EPA.

In June of 2002, California completed a review of published studies on the health effects of PM and sulfates, the highest priority pollutant. The ARB revised the PM_{10} standard and established a new $PM_{2.5}$ annual standard.[3] ARB also reviewed the published scientific literature on ground-level O_3 and NO_2 and subsequently recommended revisions to standards for these two pollutants. The revised standards for O_3 and NO_2 went into effect in May 2006 and March 2008, respectively. [4, 5]

The primary NAAQS established under the CAAA-90 and California State Standards are listed in Table 3-1.

[2] http://www.arb.ca.gov/planning/sip/planarea/easternkern/easternkern.htm
[3] http://www.arb.ca.gov/research/aaqs/std-rs/bdsum620/bdsum620.htm
[4] http://www.arb.ca.gov/research/aaqs/ozone-rs/ozone-rs.htm
[5] http://www.arb.ca.gov/research/aaqs/no2-rs/no2-rs.htm

Table 3-1. California and National Ambient Air Quality Standards

Ambient Air Quality Standards						
Pollutant	**Averaging Time**	**California Standards** [1]		**Federal Standards** [2]		
		Concentration [3]	**Method** [4]	**Primary** [3,5]	**Secondary** [3,6]	**Method** [7]
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.075 ppm (147 µg/m^3)		
Respirable Particulate Matter (PM10)	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)	24 Hour	No Separate State Standard		35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	15.0 µg/m^3		
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m^3)	None	Non-Dispersive Infrared Photometry (NDIR)
	1 Hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	—
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm (57 µg/m3)	Gas Phase Chemiluminescence	53 ppb (100 µg/m^3) (see footnote 8)	Same as Primary Standard	Gas Phase Chemiluminescence
	1 Hour	0.18 ppm (339 µg/m^3)		100 ppb (188 µg/m^3) (see footnote 8)	None	
Sulfur Dioxide (SO_2)	24 Hour	0.04 ppm (105 µg/m^3)	Ultraviolet Fluorescence	—	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)[9]
	3 Hour	—		—	0.5 ppm (1300 µg/m^3) (see footnote 9)	
	1 Hour	0.25 ppm (655 µg/m^3)		75 ppb (196 µg/m^3) (see footnote 9)	—	
Lead[10]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	—
	Calendar Quarter	—		1.5 µg/m^3	Same as Primary Standard	High Volume Sampler and Atomic Absorption
	Rolling 3-Month Average[11]	—		0.15 µg/m^3		
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per kilometer — visibility of ten miles or more (0.07 — 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		**No Federal Standards**		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[10]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

See footnotes on next page …

For more information please call ARB-PIO at (916) 322-2990 **California Air Resources Board (09/08/10)**

µg/m^3 – micrograms per cubic meter
mg/m^3 – milligrams per cubic meter

Table 3-1 Notes:

1. California standards for O_3, CO (except Lake Tahoe), SO_2 (1 and 24 hour), NO_2, suspended PM — PM_{10}, $PM_{2.5}$ and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards (other than O_3, PM and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The O_3 standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the EPA for further clarification and current federal policies.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25 degrees Celsius (°C) and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; parts per million (ppm) in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.
5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
7. Reference method as described by the EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the EPA.
8. To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective 22 January 2010). To directly compare the national standards to the California standards the units can be converted from parts per billion (ppb) to ppm. In this case, the national standards of 53 ppb and 100 ppb are identical to 0.053 ppm and 0.100 ppm, respectively.
9. On 2 June 2010, the EPA established a new 1-hour SO_2 standard, effective 23 August 2010, which is based on the 3-year average of the annual 99th percentile of 1-hour daily maximum of 0.14 ppm and the annual primary SO_2 standard of 0.030 ppm, effective 23 August 2010. The secondary SO_2 standard was not revised at that time; however, the secondary standard is undergoing a separate review by EPA. Note that the new standard is in units of ppb. California standards are in units of ppm. To directly compare the new primary national standard to the California standard, the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.
10. The ARB has identified Pb and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
11. National Pb standard, rolling 3-month average: final rule signed 15 October 2008.

3.1.3 Local Regulations

The EPA delegates responsibility to meet the NAAQS requirements to the ARB. The ARB further delegates the NAAQS as well as the California AAQS to the EKAPCD. As shown on Figure 3-1, Edwards AFB is located within the jurisdiction of three local air districts: the EKAPCD, Mojave Desert Air Quality Management District and Antelope Valley Air Pollution Control District. The proposed action falls within the EKAPCD regulatory boundaries. The federal NAAQS and California AAQS nonattainment status for EKAPCD is provided in Table 3-2. The current EKAPCD 8-hour O_3 federal designation is nonattainment – Marginal and in attainment or unclassified for all other pollutants.[6] The EKAPCD O_3 and PM_{10} state designation is nonattainment and in attainment or unclassified for all other pollutants. Note that EKAPCD segregates federal PM_{10} designations into three distinct geographical areas. The proposed action falls within the area designated as unclassified/attainment.

Table 3-2. EKAPCD Attainment Status of Criteria Pollutants (1)

Pollutant	Designations/Classifications	
	National Ambient Air Quality Standards (NAAQS)	California AAQS for EKAPCD
O_3 - 1 Hour	Attainment(2)(3)	Moderate Nonattainment
O_3 - 8 Hour(4)	Nonattainment / Classified Marginal	Nonattainment
PM_{10}(5)	Unclassified / Attainment	Nonattainment
$PM_{2.5}$(6)	Unclassified / Attainment	Unclassified
CO	Unclassified / Attainment	Unclassified
NO_2	Unclassified	Attainment
SO_2	Unclassified	Attainment
Pb Particulates	No Designation	Attainment

Notes:

1. http://www.kernair.org/Documents/EKAPCD_Attainment-Nonattainment.pdf
2. Previous Maintenance Areas –Revoked effective 15 June 2004.
3. EKAPCD was attainment of 1-hour ozone NAAQS at time of revocation; the proposed Attainment Maintenance designation's effective date was 21 June 2004; therefore, it did not become effective.
4. EPA Federal Register Volume 77, Number 98 (Monday, 21 May 2012), Pages 30088-30160.
5. PM10 – particulate matter less than or equal to 10 microns in diameter.
6. PM2.5 – particulate matter less than or equal to 2.5 microns in diameter.

[6] EKAPCD has jurisdiction over the eastern half of Kern County. Redesignation to marginal occurred as published in the EPA Federal Register Volume 77, Number 98 (Monday, 21 May 2012), pages 30088-30160.

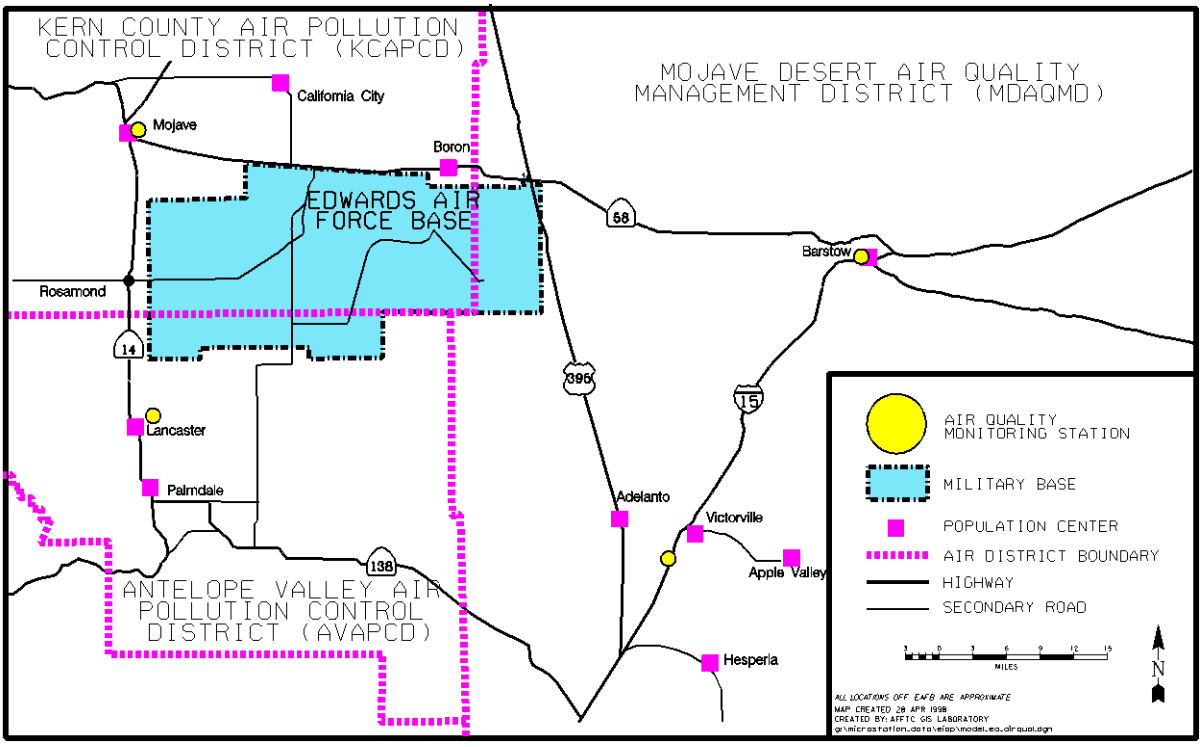


Figure 3-1. Eastern Kern Air Pollution Control District Boundary Map

3.1.3.1 EKAPCD New Source Review

For EKAPCD, New Source Review (NSR) is implemented under EKAPCD Rule 210.1, New and Modified Stationary Source Review. Specifically, this rule requires:

- Preconstruction review of new and modified stationary sources of affected air pollutants to ensure emissions will not interfere with the attainment of ambient air quality standards;
- Appropriate new and modified sources of affected pollutants are constructed with the Best Available Control Technology (BACT); and
- No net increase in emissions from new and modified stationary sources for all nonattainment pollutants and their precursors.

In order to enforce this rule, the EKAPCD established baseline emission levels for new or modified stationary sources of PM_{10}, SO_x, NO_x and VOCs in nonattainment areas. Proposed projects that generate emissions in excess of these threshold levels require offsets. These offset threshold levels are presented in Table 3-3.

Table 3-3. New Source Review Offset Emission Thresholds (Tons per Year)

Air District	PM_{10}	SO_x	VOC	NO_x
EKAPCD	15	27	25	25

Source: EKAPCD Rule 210.1 (adopted 4 May 2000)

Construction and mobile emissions are not subject to these permitting requirements. However, the operational emissions associated with the proposed action require EKAPCD-issued air pollution control permits such as an ATC and a PTO to ensure compliance with all applicable federal, state and local regulations.

3.1.3.2 EKAPCD Title III and Title V

Under the CAAA-90, Title V requires that major sources of air pollutants within each air district obtain a federal operating permit.[7] Edwards AFB currently exceeds the major source threshold for criteria air pollutants. The Title V permit includes all local air district permits (i.e., criteria pollutants and hazardous air pollutants [HAPs]) and documents compliance with other CAA regulations. Edwards AFB currently operates in compliance with the EKAPCD-issued Title V permit. In addition to the criteria pollutant regulations, the CAAA-90 also sets forth regulations to control emissions of HAPs.[8] HAPs are defined as air pollutants that cause serious human health effects including mortality. Title III of the CAAA-90 identifies compounds and chemicals defined as HAPs and regulated by the EPA. Because pollutants are added and deleted, currently identified pollutants should be recognized as a dynamic list and not the ultimate list of HAPs.[9]

Title III of the CAAA-90 places more stringent restrictions on the allowable emissions of various types of hazardous and toxic substances into the air and requires that technology-based control

[7] CAAA Title V is regulated through 40 CFR Part 70.
[8] Title III is regulated through 40 CFR Parts 61 and 63.
[9] The following web site provides the original list of air toxics: http://www.epa.gov/ttn/atw/188polls.html

measures be implemented to meet the stricter emission standards. These technology-based standards are known as Maximum Available Control Technology (MACT) and are authorized by Section 112 of the CAA. The regulations are published in 40 CFR Parts 61 and 63. The EPA sets MACT standards for numerous source categories of hazardous/toxic substances. MACT standards are available for many source types found at Edwards AFB, such as boilers, combustion engines, aerospace operations, asbestos, gasoline dispensing facilities, hazardous waste combustion, municipal solid waste landfills, paint stripping and surface coating.

HAPs are regulated through the National Emission Standards for Hazardous Air Pollutants (NESHAPs). A full list of NESHAPs MACT standard categories can be found at the EPA website.[10]

The applicability of a NESHAP to a facility operation is determined by the potential to emit (PTE) of HAPs from all applicable sources and a PTE threshold value that is set by the area nonattainment status. The HAP PTE threshold values for all local districts are 10 tons per year for a single HAP and 25 tons per year for any two or more HAPs. Edwards AFB is defined as a major source of HAPs and must comply with all applicable NESHAPs. Applicable NESHAPs are regulated by the EKAPCD Title V permit.

Construction and mobile emissions are not subject to these permitting requirements. However, the operational emissions associated with the proposed action require Edwards AFB to apply to the EKAPCD for a Title V permit modification to ensure compliance with all applicable federal local regulations.

3.1.3.3 Regulation of Greenhouse Gas Emissions

Climate change poses a serious threat to the economic well-being, public health, natural resources and the environment. Global warming is projected to have detrimental effects on industries, including agriculture and tourism, increase the strain on electricity supplies and contribute to unhealthy air. National and international actions are necessary to fully address the issue of global warming. Action taken by the federal government and California to reduce emissions of greenhouse gases will have important effects by reducing emissions of greenhouse gases (GHG). GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride, hydrofluorocarbons and perfluorocarbons. GHGs are typically reported as Carbon dioxide equivalent" or "CO_2 equivalent" or "CO_2e" which provides a measure for comparing CO_2 with other GHGs, based on the quantity of those gases multiplied by the appropriate number of metric tons of CO_2 emissions with the same global warming potential (GWP) factor and commonly expressed as one metric ton of carbon dioxide equivalents ($MTCO_2e$) ton of another greenhouse gas. For the purposes of this article, global warming potential values listed in Table A-1 of 40 CFR Part 98 are used to determine the CO_2 equivalent of emissions.

On 30 October 2009, EPA issued the Mandatory Reporting of Greenhouse Gases Rule (EPA Mandatory Reporting Rule [MRR]).[11][12] The EPA MRR applies to direct GHG emitters, fossil

[10] http://www.epa.gov/ttn/atw/mactfnlalph.html
[11] Codified under 40 CFR Part 98, Mandatory GHG Reporting.
[12] The following link: http://www.epa.gov/climatechange/emissions/ghgrulemaking.html provides information to the EPA GHG Reporting Program and includes the regulation, fact sheets and additional resources.

fuel suppliers and industrial gas suppliers, with a reporting threshold of 25,000 metric tons (MT) or more of carbon dioxide equivalent (CO_2e) per year. The purpose of this rule is to collect accurate and timely GHG data to inform future policy decisions.

The EPA MRR applies to direct GHG emitters, fossil fuel suppliers and industrial gas suppliers, with a reporting threshold of actual emissions of 25,000 MT or more of CO_2e per year. Reporting is at the facility level. Most importantly, EPA allows military installations to use distinct independent functional groupings to define the reporting facility as follows: [13]

> *"Facility means any physical property, plant, building, structure, source, or stationary equipment located on one or more contiguous or adjacent properties in actual physical contact or separated solely by a public roadway or other public right-of-way and under common ownership or common control, that emits or may emit any greenhouse gas.* ***Operators of military installations may classify such installations as more than a single facility based on distinct and independent functional groupings within contiguous military properties."***

Based on this disaggregation, Edwards AFB is near the reporting threshold and may trigger the reporting requirement if emissions continue to increase.

On 15 December 2011, the California Office of Administrative Law approved the revised ARB GHG MRR with an effective date of 1 January 2012. For Edwards AFB, all future reports, beginning with the 2013 submittal of 2012 data, must comply with the abbreviated reporting requirements.[14] The ARB is the agency responsible for determining compliance with this regulation.

The revisions that are most relevant to Edwards AFB activities include, but are not limited to:

1. A reduction in the applicability threshold for stationary combustion facilities from 25,000 MT to 10,000 MT of CO_2e AND an aggregate maximum heat input capacity of 12 million British thermal units per hour (MMBtu/hr) or greater.
2. Facilities generating between 10,000 MT and 25,000 MT CO_2e may submit an abbreviated GHG report. Third party verification is not required.

Affected facilities submit reports annually and provide data collected during the previous calendar year (CY). Reports for CY 2010 were due on 30 September 2011. Reports for future years are due on 31 March for emissions in the previous CY. The annual reports are submitted to EPA electronically using an electronic GHG reporting tool (e-GGRT), which is accessed through the Regulation's webpage. EPA verifies the data submitted and, unlike the California regulation, does not require third party verification. Prior to EPA verification, reporters are required to self-certify the data submitted to EPA.

[13] The following EPA guidance was provided in a 2 August 1996 memorandum: http://www.epa.gov/ttncaaa1/t5/memoranda/dodguid.pdf

[14] The final regulation and supporting documents are posted at: http://www.arb.ca.gov/regact/2010/ghg2010/ghg2010.htm.

During 2010 and 2011, ARB proposed various changes to the California MRR to harmonize its GHG emissions reporting requirements with the EPA MRR and the California Cap-and-Trade Program. By aligning requirements with federal requirements and other state programs, ARB aimed to minimize duplicative reporting by developing a unified reporting system that is compatible with all GHG programs.

On 14 December 2011, the California Office of Administrative Law approved the amended regulation. The amendments relevant to Edwards AFB activities include but are not limited to:

- An increase in the applicability threshold for electricity generation facilities from 2,500 MT to 10,000 MT of CO_2e.
- A reduction in the applicability threshold for Stationary Combustion facilities from 25,000 MT to 10,000 MT of CO_2e and an aggregate maximum heat input capacity of 12 MMBtu/hr or greater.
- Facilities generating between 10,000 MT and 25,000 MT CO_2e may submit an abbreviated GHG report. Abbreviated GHG reports are:
  - Due no later than 1 June of each CY,
  - Based on default emission factors and default fuel heating values,
  - Not required to keep a written GHG Monitoring Plan,
  - Not required to undergo third party verification and
  - Not required to report until 1 June 2013 for CY 2012 GHG emissions; no reporting is required for CY 2010 or CY 2011 emissions.[15]

3.1.3.4 Assembly Bill 2588

The Air Toxics "Hot Spots" Information and Assessment Act of 1987 (Assembly Bill [AB] 2588, California State Health and Safety Code, Sections 44300 through 44384) established the Air Toxic Hot Spots Program. AB 2588 created a program to inventory routine emissions of toxic substances into the air and to assess the public health risk to those who are exposed. As of 1998, there were over 450 toxic substances listed under AB 2588. Toxics can be added to or deleted from this list. At Edwards AFB, toxic substances are generated as a result of various processes including aircraft cleaning and painting, lubricating processes, the operation of internal combustion engines (e.g., auxiliary ground equipment, boilers, turbine engines, etc.) and adhesives/sealant applications.

AB 2588 requires facilities to submit emission inventory plans and reports to local air districts. These emission inventory plans and reports track the emissions of the listed air toxics. Based on these reports, facilities are designated by the local air district as high, medium or low priority. This designation determines the specific requirements needed to comply with AB 2588. In 2010, EKAPCD rated Edwards AFB as an intermediate priority facility.[16]

[15] This section only applies for facilities that were not previously subject to annual reporting.

[16] http://www.kernair.org/Main_Pages/Subpages/Info_Sub/Reports.html

An intermediate level designation means that Edwards AFB has either: 1) an approved health risk assessment showing increased cancer risk is less than 10 in 1 million and a total hazard index (THI) less than 1.0, or 2) a prioritization score less than 10.0, but more than 1.0 (health risk assessment not required).[17]

Facility Name	Heath Risk Assessment		Prioritization Score	
	Cancer	Non-Cancer	Cancer	Non-Cancer
Edwards Air Force Base	0.13 in 1 million	0.81	3.0	2.6

3.1.4 General Conformity Applicability Analysis and Determination

Section 176(c) of the CAAA-90 contains legislation for the general conformity rule and prohibits federal agencies from conducting, supporting or approving actions that do not conform to an approved SIP.[18] Federal agencies are required to conduct a conformity review to demonstrate their actions conform with the approved SIP for the nonattainment or maintenance area prior to initiating the action. Under Title I of the CAAA-90, Congress established two types of conformity: transportation conformity and general conformity. Transportation conformity pertains to federal transportation projects and requires these projects to conform with transportation aspects of an approved SIP. General conformity covers all other federal actions not addressed by transportation conformity. The two conformity provisions only affect federal actions occurring in nonattainment areas and maintenance areas. This proposed action does not involve a federal transportation project; therefore, the air quality analysis for this EA focuses only on general conformity.

On 24 March 2010, the EPA revised the general conformity regulations. These rules implemented CAA provisions prohibiting federal agencies from taking actions that may cause or contribute to violations of the NAAQS.

This final revised rule included the following:

- improved the federal agencies' process for demonstrating that actions will not contribute to a NAAQS violation;
- provided tools to encourage better communication and air quality planning between states and federal agencies; and
- encouraged both the federal agencies and the states to take early actions to ensure projects will conform to the SIPs to implement the NAAQS.

[17] http://www.kernair.org/Documents/Reports/AB2588Annual2010_Final.pdf, Reference Table 1.
[18] The federal conformity rule is codified in 40 CFR 93.

To meet general conformity requirements, federal entities must demonstrate that emissions from their actions will not exceed emission budgets established in the SIP to attain or maintain the NAAQS.

The final rule established requirements allowing federal facilities expecting future expansion or modifications to negotiate a facility-wide emissions budget with the applicable state air quality agencies. Actions taken that do not exceed these budgets conform to the SIP and do not need a conformity determination.

The final rule incorporates an early emission reduction credit program for all agencies that follow the Airport Early Emission Reduction guidance developed jointly by EPA and the Federal Aviation Administration. This program encourages emission reduction actions on federal installations by providing emission reduction credits that can be used to demonstrate conformity for subsequent actions on the facility.

The final rule allows emissions of one precursor pollutant to be offset by the reduction of emissions of another precursor pollutant. For example both NO_x and VOCs are O_3 precursors – they are emitted and then react in the atmosphere to form ground-level O_3. In an area that does not meet the EPA ground-level O_3 standard, reductions in NO_x emissions could be offset by reductions of VOCs.

The final rule also allows alternative schedules for mitigating emission increases where state air quality agencies can accommodate temporary emission increases in exchange for long-term or permanent emission reductions.

The final rule removed requirements for federal agencies to conduct conformity determinations for "regionally significant" actions. Such actions have emissions greater than 10% of the emissions inventory for a nonattainment area. These analyses have been conducted for 16 years and have never shown an action to interfere with attainment or maintenance of a NAAQS.

The final rule lists categories of actions that federal agencies can presume to conform. The final rule also allows states to establish "presumed to conform" lists for actions in their state.

The DoD, like all Federal agencies, must determine whether a proposed action conforms to the SIP in each state where activities would occur. The general conformity rule establishes an elaborate process for analyzing and determining conformity and is outlined in the following steps and illustrated in Figure 3-2: Some or all of the following steps may be applied in performing a conformity determination.

Step 1: Define the USAF Action. It is important to define the federal action properly and to clearly define the base case. It is the comparison of emissions under the proposed action to those of the base case that forms the basis of the conformity applicability analysis. Conformity requires consideration of both direct and indirect emissions, some of which might not be subject to new source review and air permitting procedures. Refer to Section 4.1 for additional discussion.

Step 2: Determine Whether the Action Takes Place in a Nonattainment or Maintenance Area. The proposed action takes place in the EKAPCD ozone nonattainment area.

Step 3: Determine Whether the Action Would Cause Emissions of Pollutants of Concern. General conformity requires analysis only of emissions of pollutants of concern, defined as those criteria pollutants and their precursors for which the area is designated nonattainment or that are covered by a maintenance plan.

Step 4: Determine Whether the Action or a Portion Thereof is Exempt. If the entire action is exempt, no conformity determination is required. If a portion of the action is exempt, the remainder of the action must still be evaluated. The categories applicable to this proposed action are listed below:

- Actions with no emissions or emissions that are clearly de minimis [40 CFR 93.153(c)(2)].
- Actions having emissions that are not "reasonably foreseeable" [40 CFR 93.153(c)(3)].
- Actions that implement or carry out a conforming program [40 CFR 93.153(c)(4)].
- Actions or portions that are excluded from conformity requirements [40 CFR 93.153(d)]:

    - The portion of an action that includes a major or minor new or modified stationary source requiring a permit under the CAA NSR or Prevention of Significant Deterioration (PSD) programs;

Step 5: Determine Whether the Proposed Action as a Whole (excluding portions screened out in Step 4) is Presumed to Conform. If certain requirements are met, the following are presumed to conform and are exempt from conformity:

- If finalized in the Federal Register, actions on the Air Force presumed-to conform (PTC) list [40 CFR 93.153(f)];
- Actions with SIP-approved, facility-wide emissions budgets [40 CFR 93.153(i)(1)];
- Prescribed fires [40 CFR 93.153(i)(2)]; and
- Actions identified in the SIP as presumed to conform [40 CFR 93.153(i)(3)].

Regardless of a presumption of conformity, no action can be presumed to conform if EPA or a third party can show that the action would cause one of the conditions prohibited in 40 CFR 93.153(j). In such an event, the conformity evaluation would need to be redone considering the other requirements of 40 CFR 93.153.

Step 6: Estimate Net Total Direct and Indirect Emissions from the Action. To determine whether an action is de minimis, the total direct and indirect emissions of pollutants of concern must be calculated. The following points are important in determining the total:

- The greatest annual emissions form the basis of the analysis.
- The emissions are "net," that is, emissions added by the action increase the total emissions, while emissions removed by the action reduce the total.

- Direct emissions are those that are caused or initiated by the USAF action in the same nonattainment or maintenance area as the action, that occur at the same time and place and that are reasonably foreseeable.

- Indirect emissions are those that are caused by the USAF action in the same nonattainment or maintenance area in which the action is taking place but that may occur later in time and may be further removed in distance from the action itself but that are still reasonably foreseeable, those over which the USAF can practically control and those for which the Air Force has a continuing program responsibility.

  Indirect emissions must be caused or initiated by the USAF action, be reasonably foreseeable, be practically controllable by the USAF and be part of a continuing USAF program responsibility. Typical indirect sources for USAF actions include privately owned vehicles used by employees for commuting, private entities that would not operate without the USAF action, vehicles associated with operation of indirect sources on the installation and material deliveries. Commuter and material delivery emissions could be generated during both the construction and operations phases of an action. Consideration of all indirect emissions is not required even if they are caused by the action and are reasonably foreseeable. For example, increased commuter vehicle emissions should be included, because these are considered practicably controllable by the USAF through programs such as parking restrictions and ride-sharing incentives. On the other hand, trips to stores by workers and their families would not be included because the USAF has no practical means of controlling these discretionary trips.

Annual emissions are those occurring during a calendar year. Emissions from activities occurring in different years need not be added when determining greatest annual emissions. Similarly, if a single activity occurs in two different years, only the emissions from the fraction occurring in a single year contribute to the emissions for that year. This consideration can be important when estimating annual emissions from short-term activities, such as construction. Emissions must originate in the nonattainment or maintenance area in which the action is located. For example, if a new stationary source is built in a nonattainment area and will require new workers for operation, only that portion of the indirect emissions from new worker commutes in the nonattainment area would need to be considered.

Calculating Emissions. Current data and information to estimate direct and indirect emissions should be used and fugitive emissions should be included in the totals. 40 CFR 93.159(b) requires the use of the latest and most accurate emissions estimation techniques for performing conformity analyses:

- Motor vehicle emissions must be estimated by using the most current version of the EPA motor vehicle emissions model (MOVES2010) or the Air Force Center for Engineering and the Environment (AFCEE) Mobile Source Emission Factor Guide (2009). The specified techniques must be used unless they are inappropriate, in which case the EPA Regional Administrator must grant written approval for other techniques to be used.

- Nonmotor vehicle emissions must be estimated by using the latest emissions factors from EPA in Compilation of Air Pollutant Emission Factors (AP-42) (EPA 2010b) or the AFCEE Mobile Source Air Emission Guide (2009), unless more accurate data, such as stack tests, are available [40 CFR 93.159(b)(2)].

All emissions estimates should be realistic and technically defensible. The procedures and factors used to prepare annual emissions inventories and permits would usually be acceptable for conformity but may need updating. Reasonable upper bounds can be used if specific factors are not available. As the agency responsible for conformity review, the USAF has ultimate responsibility for determining acceptable emissions calculation procedures. However, if there is doubt about the validity of methods, the local regulator or EPA Regional Office should be consulted.

Step 7: Compare the Greatest Annual Total Emissions to De Minimis Levels. For each pollutant or precursor of concern, the greatest net annual emissions change must be compared with the de minimis threshold values specified in 40 CFR 93.153(b)(1) and (b)(2). These emission rates are often referred to as de minimis levels or thresholds and are presented in Table 3-4. The rates depend on the pollutant/precursor; whether the area is classified as nonattainment or maintenance and, if nonattainment, the severity of the nonattainment; and whether the area is in an ozone transport region. If the total emissions equal or exceed the de minimis levels, a conformity determination may be required. If one or more de minimis thresholds are exceeded, consideration should be given to adjusting the action to reduce net emissions changes to levels below thresholds, thereby avoiding the need for a conformity determination.

Step 8: Determine Whether the Action can be Adjusted to Avoid a Conformity Determination. There are two main reasons for avoiding a conformity determination, if possible: (1) the additional time required to complete a conformity determination and (2) the additional resources required. If the action has emissions above de minimis levels, a conformity determination may be required. It is permissible to adjust the action to avoid conformity. It is not permissible to break the action into small pieces (segment the action) to avoid conformity.

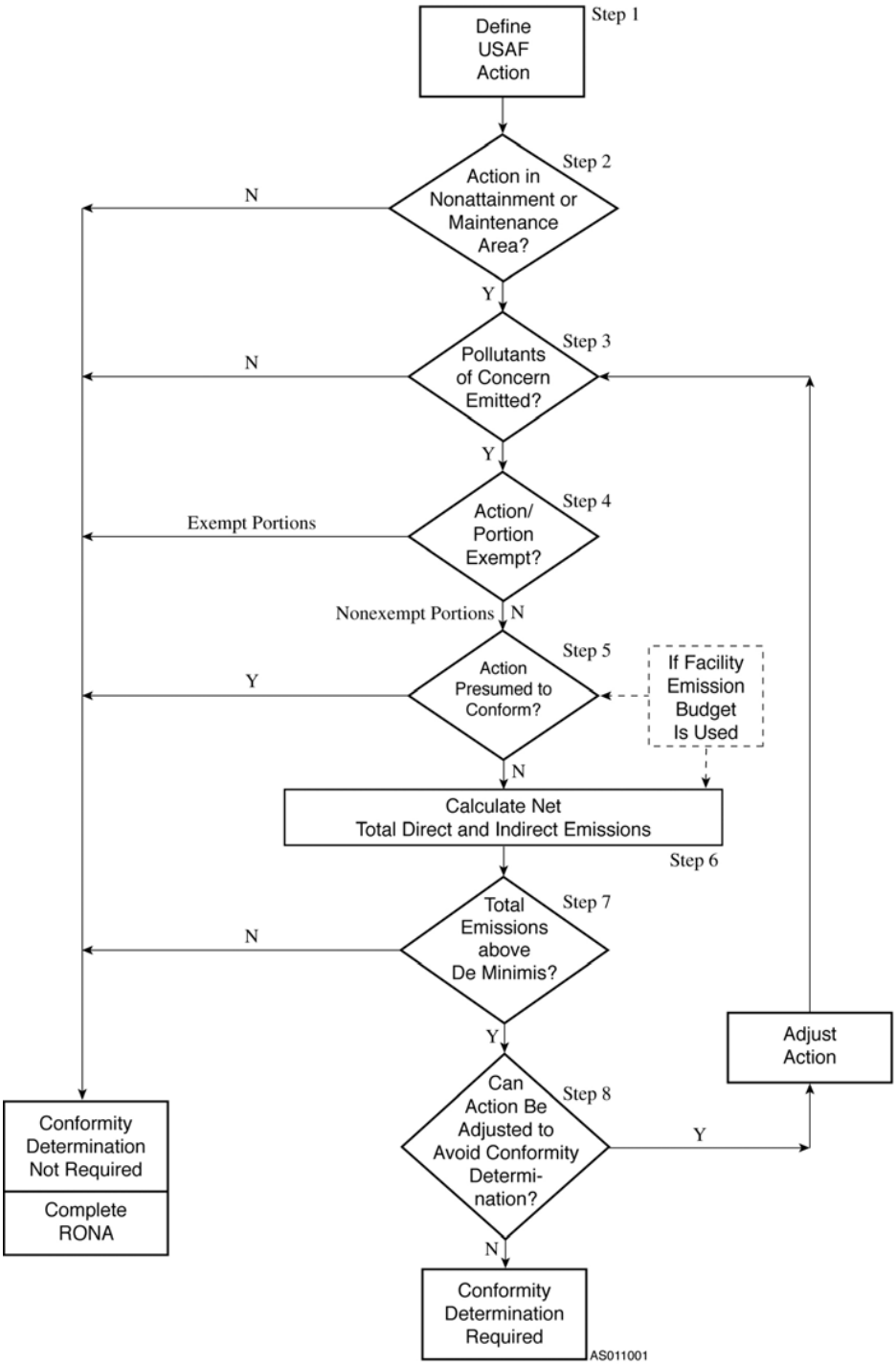


Figure 3-2. General Conformity Flowchart of Applicability Analysis

Section 93.153 provides the applicability discussion regarding conformity. The following applicability discussion is provided:

93.153 (a) Conformity determinations for Federal actions related to transportation plans, programs and projects developed, funded, or approved under title 23 U.S.C. or the Federal Transit Act (49 U.S.C. 1601 et seq.) must meet the procedures and criteria of 40 CFR part 51, subpart T, in lieu of the procedures set forth in this subpart. This section does not apply to the proposed action.

93.153 (b) For Federal actions not covered by paragraph (a) of this section, a conformity determination is required for each criteria pollutant or precursor where the total of direct and indirect emissions of the criteria pollutant or precursor in a nonattainment or maintenance area caused by a Federal action would equal or exceed any of the rates in paragraphs (b)(1) or (2) of this section.

(1) For purposes of paragraph (b) of this section, the rates detailed in Table 3-4 apply in the EKAPCD nonattainment areas:

Table 3-4. Applicable Nonattainment Area Emission Thresholds for the Proposed Action

	Tons/year
Ozone (VOC's or NO_X):	
Other ozone NAA's outside an ozone transport region	100

However, the requirements of this subpart shall not apply to Federal actions where the total of direct and indirect emissions are below the emissions levels specified above.

Notwithstanding the other requirements of this subpart, a conformity determination is not required for Federal actions (or portion thereof) that includes major or minor new or modified stationary sources that require a permit under the new source review (NSR) program (Section 110(a)(2)(c) and Section 173 of the Act) or the prevention of significant deterioration program (title I, part C of the Act).

3.1.5 California Environmental Quality Act

The California Environmental Quality Act (CEQA) is a statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible.

CEQA applies to certain activities of state and local public agencies. A public agency must comply with CEQA when it undertakes an activity defined by CEQA as a "project." A project is an activity undertaken by a public agency or a private activity that must receive some discretionary approval (meaning that the agency has the authority to deny the requested permit or approval) from a government agency that may cause either a direct physical change in the environment or a reasonably foreseeable indirect change in the environment. The proposed installation of the JETC will require an ATC from the EKAPCD.

This proposed project requires compliance with both CEQA and NEPA and the EKAPCD is the lead agency under CEQA, the EKAPCD will use the federal Environmental Impact Statement (EIS) or Finding of No Significant Impact (FONSI), provided the federal document is prepared before the EKAPCD environmental document and it complies with State CEQA Guidelines.

EKAPCD indicates that some proposed projects do not have significant (as defined by CEQA, Section 21068) air quality impact on the environment. The following operations do not have significant air quality impact on the environment:

1. Emit (from all project sources subject to EKAPCD Rule 201) less than offsets trigger levels set forth in Subsection III.B.3. of EKAPCD's Rule 210.1 (New and Modified Source Review Rule);
2. Emit less than 137 pounds per day of NO_x or Reactive Organic Compounds from motor vehicle trips (indirect sources only);
3. Not cause or contribute to an exceedance of any California AAQS or NAAQS;
4. Not exceed the District health risk public notification thresholds adopted by the EKAPCD Board; and
5. Be consistent with adopted federal and state Air Quality Attainment Plans.

State CEQA Guidelines also provide that certain categories of projects are exempt from environmental review except in certain instances (e.g., unusually sensitive location or other circumstances). (See CEQA Guidelines, Section 15300.2.) Projects exempt from EKAPCD permits pursuant to EKAPCD Rule 202 are not subject to CEQA review by the District.

The proposed JETC project is considered by the EKAPCD to be exempt from CEQA because by complying with EKAPCD's Rules and Regulations they do not have the potential for significant environmental impact:[19]

Specific EKAPCD Exemptions (Ref. Rule 202):

Boilers - gas fired or commercial fuel oil-fired (emphasis added)
Gas Turbine Engines - natural gas or commercial fuel oil fueled (emphasis added)

3.2 Noise (Annoyance)

3.2.1 Fundamentals of Noise

Sound can vary simultaneously in level (or loudness) and frequency content (pitch), while also varying in time of occurrence and duration. Sound pressure can be measured in units of micro Newtons per square meter (µN/m2) called micro Pascals (µPa). One µPa is approximately one-hundred-billionth of the normal atmospheric pressure. The pressure of a very loud sound may be 200,000,000 µPa, or 10,000,000 times the pressure of the weakest audible sound (20 µPa). Expressing sound levels in terms of µPa would be cumbersome because of this wide range. As

[19] Reference EKAPCD Rule 208.2.

such, sound pressure levels are described in logarithmic units of ratios of actual sound pressures to a reference pressure squared. These units are called bels, named after Alexander G. Bell. To provide a finer resolution, a bel is subdivided into decibels (deci- or tenth of a bel), abbreviated dB. Common sounds vary in amplitude over a range of many millions. For instance, an aircraft flyover may produce pressure amplitude a hundred times greater than a car driving by on a nearby street. On the logarithmic scale, these noise sources would differ by 40 dB. Figure 3-3 compares the relative sound levels associated with common sources or settings.

Noise is generally defined as unwanted or undesirable sound because it:

- Is intense enough to damage hearing;
- Interferes with speech communication and sleep; or
- Is annoying.

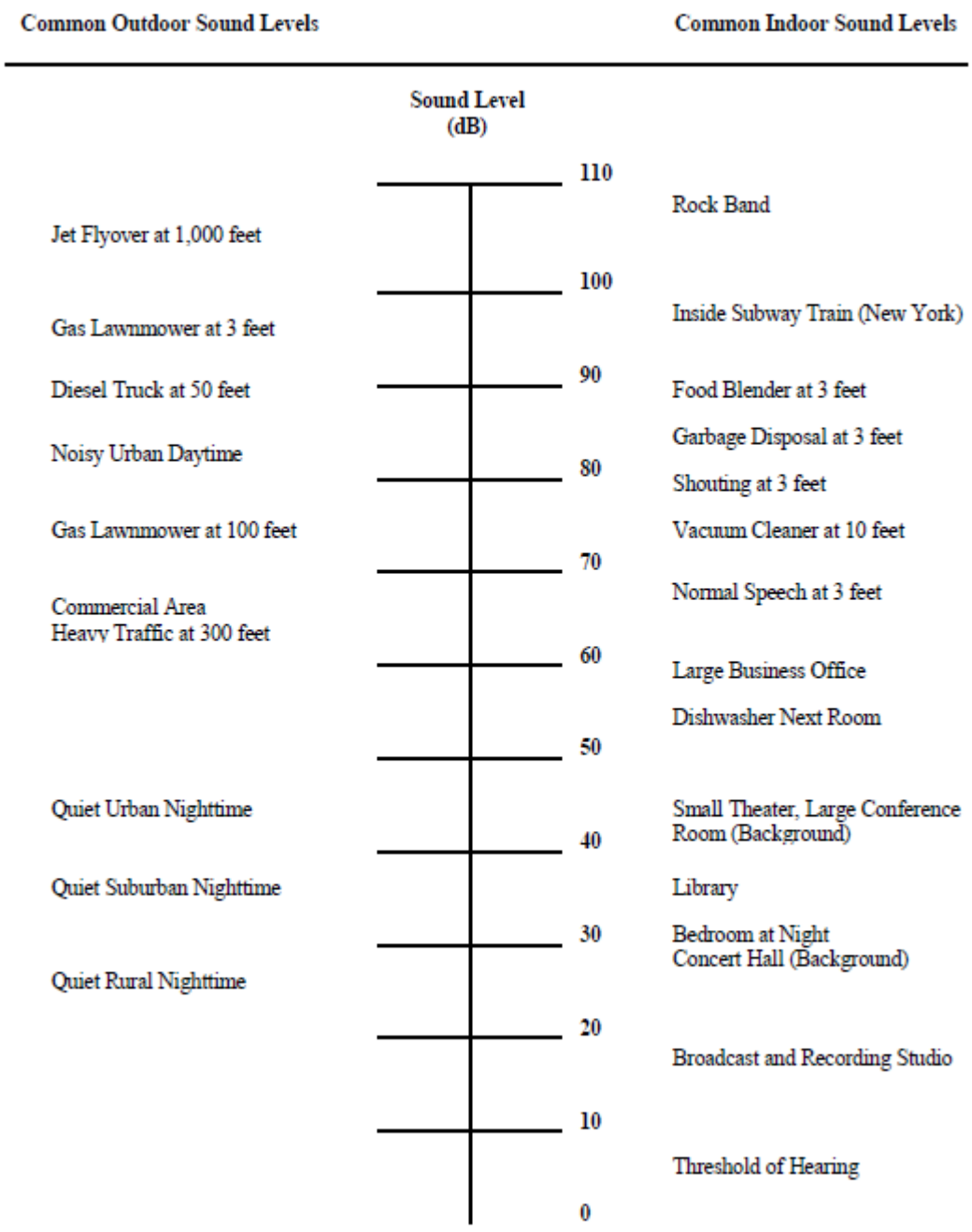


Figure 3-3. Comparative A-Weighted Sound Levels

Unless otherwise stated, all sound levels reported in this EA are in A-weighted decibels (dBA). The A weighting de-emphasizes lower frequency sounds below 1000 Hertz (1 kilo Hertz [kHz]) and higher frequency sounds above 4 kHz. It emphasizes sounds between 1 kHz and 4 kHz. A-weighting is the measure most used for environmental noise throughout the world. Most community noise standards utilize A-weighting, as it provides a high degree of correlation with human annoyance and health effects.

Because environmental noise varies with time, it is beneficial to define certain measurement terms that are used to characterize this fluctuating quantity. The true energy-average level over a specific period is defined as the Equivalent Sound Level (L_{eq}). L_{eq} is the sound pressure level over a time interval that is equivalent to a perfectly constant sound pressure level containing the same acoustic energy over the same interval. Thus, L_{eq} includes all sporadic or transient events occurring during the given event.

Other descriptors are also commonly applied to identify noise/land use compatibility guidelines and assist in the prediction of community reaction to adverse effects of environmental noise. These descriptors include the Day-Night Noise Level (DNL or L_{dn}); and in California, the Community Noise Equivalent Level (CNEL). DNL and CNEL are 24 hour time-weighted average noise metrics that account for individual noise events, the number of times those events occur and the time of day they occur. CNEL is calculated based on noise levels and operational activity occurring during three time periods: daytime (07:00 to 19:00), evening (19:00 to 22:00) and nighttime (22:00 to 07:00). To represent the added intrusiveness of sounds during evening and nighttime hours, CNEL adds weights of 4.77 dB and 10 dB to events during those periods, respectively.

3.2.2 Applicable Noise Criteria

The Federal Interagency Committee on Noise developed land use compatibility guidelines for noise and provides recommended DNL ranges for various land use categories based on this committee's findings. DNL values of 65 dB and less, are generally compatible with all types of land uses. Residential, public and some types of recreational land uses (e.g., outdoor music amphitheaters, nature reserves, etc.) are generally not considered compatible with DNL ranges in excess of 65 dB. Commercial, industrial and other types of recreational land uses (e.g., sports arenas, golf courses, amusement parks, etc.) are generally considered compatible with DNL ranges between 70 and 75 dB, if measures are incorporated into the design and construction of structures associated with these land uses. Some transportation (i.e., railways and airports) and manufacturing land uses (i.e., mining, nonlivestock agriculture, fishing and forestry) can tolerate DNL ranges in excess of 85 dB.

California law mandates use of the CNEL for assessing aircraft noise exposure.[20] The United States Air Force (USAF) recognizes CNEL as an alternative metric to DNL for land use compatibility determination around military bases in California.

CNEL is used in this EA for the discussion of noise conditions related to operations at Edwards AFB. CNEL contours are graphical representation of the distribution of noise over the surrounding area from the Base's average annual daily aircraft operations.

[20] California Code of Regulations, Title 21, Division 2.5, Chapter 6

3.2.3 Existing Noise Environment

Noise-sensitive receptors at Edwards AFB include military family housing, the dormitories, the Community Health Clinic, schools, child development center and chapels. These receptors are located at varying distances from the proposed project site of the new JETC facility.

Alternative A, the proposed action, is located adjacent to existing facility Building 3810 within the Main Base of Edwards AFB. The nearest noise-sensitive receptors to the proposed project site include a library, an education center, a chapel and dormitories located approximately 3,500 feet, 4,000 feet, 4,500 feet and 4,800 feet, respectively, from the project site. The nearest off-base noise-sensitive locations are homes located over 15 miles west/southwest of the project site.

The primary sources of noise at Edwards AFB are subsonic and supersonic aircraft operations. Secondary sources include surface vehicular traffic, rail service operations, engine run-ups and other tests and equipment required for ground facility operations. Noise due to subsonic flights is produced from engine/propulsion noise and airflow noise generated as the airframe passes through the air. The same noise sources are present with supersonic flights, but the aircraft are often at such altitudes that this noise has been greatly reduced because of the distance and atmospheric absorption. Ambient noise levels in the developed portions of the Base are identified in Table 3-5.

Table 3-5. Ambient (Background) Noise Levels Recorded at Various Base Locations

Location	L_{dn}
Edwards AFB Housing Area and Vicinity	
**** Back of Community Health Clinic***	***67.7***
**** Unpaved Parking Area Near Schools***	***36.9***
**** Northeast of the Hospital Dormitory***	***61.7***
**** Intersection of Forbes Avenue and Yeager Boulevard***	***61.5***
**** Chapel***	***53.6***
**** Golf Course***	***54.3***
Main Base	
**** Building 1200 (Base Operations/Base Exchange Cafeteria)***	***68.8***
**** Building 1632 (Aircraft Research Engineering Maintenance Facility)***	***75.6***
North Base	
**** Near JPL Building 4231 (Satellite Communications Ground Terminal)***	***60.6***
**** Near Taxiway/Runway Intersection***	***57.2***
**** At Building 4444 (Research Equipment Storage)***	***65.0***
South Base	
**** B-2 Area***	***67.9***
**** Main Runway (Southeast of)***	***72.4***
**** Inactive Runway***	***60.8***
Air Force Research Laboratory	
**** Near Building 8255 (Equipment Research Engineering)***	***54.7***
**** Near Building 8483 (Missile in Space Research Support)***	***46.1***
NASA/Dryden Flight Research Center	
**** Near Building 4850 (NASA Child Development Center)***	***65.5***

Source: *Programmatic Environmental Assessment for the Comprehensive Plan of Edwards Air Force Base, California* (U.S. Army Corps of Engineers and AFFTC 1994)

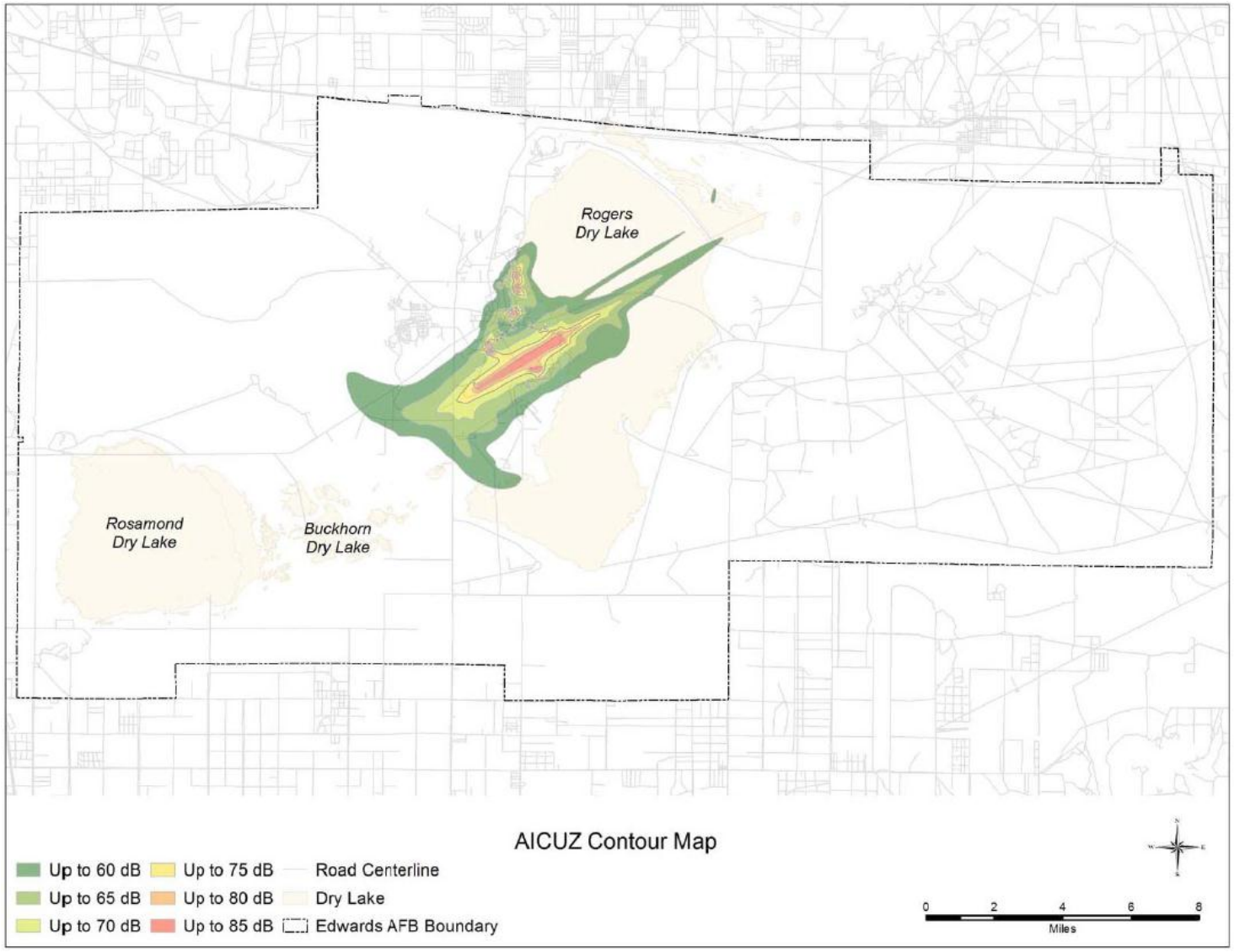
Notes: 1. AFB – Air Force Base
2. JPL – Jet Propulsion Laboratory
3. NASA – National Aeronautics and Space Administration
4. Ldn – the day/night equivalent noise level. It incorporates a 10-decibel penalty for nighttime noise between 10 pm and 7 am to reflect the added likelihood of annoyance during this period.

Existing CNEL contours at Edwards AFB are shown on Figure 3-4. These contours are noise exposure levels due to flightline operations, including aircraft takeoffs, landings and maintenance ground run-ups. There are currently no residential or incompatible land uses located within the Edwards AFB 65 dB CNEL or greater noise contours.

Currently, noise complaints are handled by the Public Affairs Office.[21] Complaints are also compiled by the Central Coordinating Facility (and reported to the Complex Control Board). These complaints are grouped into three categories: low level, noise and sonic booms. After investigation, the complaints are further classified as follows: deviation unverified and no deviation.

[21] For example, any noise associated with AFTC use of the R-2508 Complex.

Figure 3-4. Noise Contour Map



Source: Edwards AFB General Plan 2011

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3.3 Water Resources

Water Resources describes the quality, quantity, sources and use of water at Edwards AFB. This includes drinking (potable) water, wastewater and stormwater. Edwards AFB has various facilities dedicated to Water Resources. They include six chlorination points for drinking (potable) water, two operating wastewater treatment plants (Main Base and the Air Force Research Laboratory [AFRL]), a reclaimed water distribution system, numerous water storage tanks, evaporation ponds and a storm water drainage system.

3.3.1 Regulatory Requirements/Guidance

The federal Clean Water Act (CWA) (33 USC 1251 et seq.) as amended, is intended to restore and maintain the chemical, physical and biological integrity of surface waters. The unauthorized discharge of any pollutant to the Waters of the U.S. is unlawful under the CWA. The CWA established the National Pollutant Discharge Elimination System (NPDES) permitting process for the lawful discharge of a limited quantity of pollutants that will not cause or contribute to the violation of a water quality standard. NPDES discharge permits are issued for wastewater and stormwater discharges and may be issued by either the EPA or a delegated State (such as California). Section 301 of the CWA (33 USC 1311) requires that dischargers treat their wastewater prior to discharge in order to meet the minimum water quality standards. Section 304 (33 USC 1311) specifies the guidelines to be used for meeting minimum quality standards for wastewater discharges and states the best practicable, available control technology for various categories of discharge sources in 40 CFR 404 through 471. Section 402 of the CWA (33 USC 1342) regulates stormwater runoff from municipalities, industrial facilities and construction activities. In California, NPDES general permits have been issued for control of pollutants in storm water runoff from small municipal separate storm sewer systems (MS4s), industrial activities and construction activities.

Section 438 of the federal Energy Independence Security Act (EISA) of 2007 requires that any development or redevelopment project involving a federal facility with a footprint that exceeds 5,000 square feet must incorporate site planning, design, construction and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume and duration of storm flow. The intention of this requirement is to ensure that aquatic biota, stream channel stability and historical aquifer recharge rates of receiving waters are not negatively impacted by changes in runoff temperature, volume, duration and rates resulting from federal projects.

The Safe Drinking Water Act (42 USC 300), as amended, protects public drinking water supplies from harmful contaminants. The Act is administered through regulatory programs that establish standards and treatment requirements for drinking water, the control of underground injection of wastes that might contaminate water supplies and protection of groundwater.

AFI 32-1067, Water Systems, implements Air Force Policy Directive (AFPD) 32-10, Installations and Facilities; AFPD 32-70, Environmental Quality; and Department of Defense Directive (DoDD) 6230.1, Safe Drinking Water. It provides guidelines for managing drinking water and wastewater systems at USAF bases.

AFI 32-7041, Water Quality Compliance, provides details of the Air Force Water Quality Compliance Program. It applies to generating, collecting, treating, reusing and disposing of domestic and industrial wastewaters, stormwater, nonpoint-source runoff, sewage sludge and water treatment residuals.

Edwards Air Force Base Instruction (EAFBI) 32-6, *Edwards AFB Wastewater Instruction*, establishes Base policy and assigns responsibility for wastewater system oversight and operation and for accomplishing, monitoring and reporting requirements of the CWA and associated directives related to domestic and nondomestic wastewater treatment.

Edwards AFB complies with these applicable CWA requirements.

3.3.2 Overview of Hydrologic Conditions of the Edwards AFB Area

Edwards AFB occupies the northeastern portion of the Antelope Valley, within the Mojave Desert Region. This places the base within the jurisdiction of the Lahontan Region of the California Region Water Quality Control Board (Lahontan RWQCB). The topography of this area is characterized by rugged, linear fault-block mountain ranges and highlands separated by broad, gently sloping, internally-drained, basins. Within the larger valleys, undrained dry lakes or playas occupy the lowest elevations.

Climate: The Antelope Valley has a semi-arid to arid climate since it is situated in the rain shadow of the Tehachapi and San Gabriel Mountains. Precipitation, mainly in the form of rain, results from sporadic storms occurring from October to April. Between 1942 and 2000, the average annual rainfall recorded at Edwards AFB is approximately 5.12 inches per year. In 1983 a record 14 inches of precipitation fell on Edwards AFB, the most since record-keeping began in 1942. This record rainfall year provided the limits to delineate the 100-year flood plain. Ambient air temperatures at Edwards AFB are characteristic of desert conditions; with hot summers (averaging above 80 degrees Fahrenheit [^{o}F]) and cold winters (averaging below 50^{o}F). In general, winds originate from the west and southwest sustaining speeds of 30 to 40 miles per hour (mph) with gusts reaching 70 mph. Consequently, evaporation rates are very high as well, at approximately 116 inches per year [Storm Water Pollution Prevention Plan (SWPPP) for Edwards AFB 2002].

Surface Water – There are no naturally occurring lakes or perennial streams on the base. Piute Ponds in the southwest corner of the base contain over 300 acres of surface water, are fed by effluent from the Lancaster Water Reclamation Plan and function as a biological wetland. Other aquatic habitats or surface waters include the pond at Branch Park, water hazards at Muroc Golf Course and the sewage evaporation ponds at South Base and AFRL (Edwards AFB General Plan, dated 2011).

The most prominent surface water features at Edwards AFB are the playas or dry lakebeds. These include Rogers Dry Lake, Rosamond Dry Lake and Buckhorn Dry Lake. The largest of these playas is Rogers Dry Lake, covering an area approximately 46 square miles and located at the geographical center of Edwards AFB. Surface runoff from most areas of the Main Base drains to Rogers Dry Lake. The runoff is conveyed by a system of earthen and concrete channels and, in some areas, by an underground storm drain system. Rogers Dry Lake usually remains

inundated during the winter due to low permeability of the lakebed soils. Wind action moves the sediment suspended in the runoff waters around the lakebeds, sealing lakebed surface cracks and filling fissures. Shallow flooding along with consistent winds are prerequisite for maintaining the hard, compact lakebed surfaces that provide important opportunities for Edwards AFB flight test programs (Edwards AFB General Plan, dated 2011).

Rogers Dry Lake is considered one of several flood prone areas on the base. Floodplain boundaries were delineated as part of a flood assessment conducted by Edwards AFB from 2001 through 2005 for most of the developed areas of the base and refined using recent elevation data for the lakebeds (Edwards AFB General Plan, dated 2011). These floodplain boundaries are shown on Figure 3-5. The locations of the proposed project alternatives (i.e., at and/or adjacent to Buildings 3804, 3809 and 3810) are outside the delineated floodplain boundaries of Rogers Dry Lake.

The Water Quality Control Plan for the Lahontan Region (Basin Plan) lists the following as beneficial uses for Rogers Dry Lake: 1) Municipal and Domestic Supply; 2) Water Contact Recreation; 3) Non-contact Water Recreation; 4) Warm Freshwater Habitat; 5) Inland Saline Water Habitat; 6) Wildlife Habitat; 7) Water Quality Enhancement; and 8) Flood Peak Attenuation and Flood Water Storage.[22] CWA Section 303(d) requires states, territories and authorized tribes to assess surface waters as to whether the water quality supports the designated beneficial uses and to develop lists of impaired waters. Impaired waters are waters that do not meet the water quality objectives necessary to support the designated beneficial uses. Rogers Dry Lake is not designated as impaired in California's current 303(d) list.[23]

Groundwater - The Antelope Valley is underlain by a large groundwater basin that is divided into several subbasins. The two subbasins underlying Edwards AFB are the Lancaster Subbasin and the North Muroc Subbasin. The designated beneficial uses for the groundwater basin as listed in the Lahontan Region Basin Plan are: 1) Municipal and Domestic Supply; 2) Agricultural Supply; 3) Industrial Service Supply; and 4) Freshwater Replenishment.

Within the groundwater basin, two aquifers, known as the "principal" aquifer and the "deep" aquifer, underlie the Edwards AFB. The principal aquifer underlies the southern portion of Edwards AFB and extends as far north as the Rosamond Hills and east to the southern edge of Rogers Dry Lake. The deeper aquifer is believed to exist under the entire base. The principal aquifer provides much of the water used throughout the Antelope Valley, whereas the deep aquifer is the primary source of groundwater for Edwards AFB. The depth to the principal aquifer's top ranges from 175 to 325 feet below ground surface (bgs). Depth to the top of the deep aquifer ranges from 250 to 900 feet bgs. However, depth to groundwater has steadily increased over time as a result of overdrafting—the annual pumping rate has exceeded the average annual recharge every year since the 1920s (SWPPP for Edwards AFB 2002).

[22] RWQCB Lahontan Region, Water Quality Control Plan for the Lahontan Region, October 1994.
[23] 2010 California 303(d) List, final approval by EPA on 11 November 2011.

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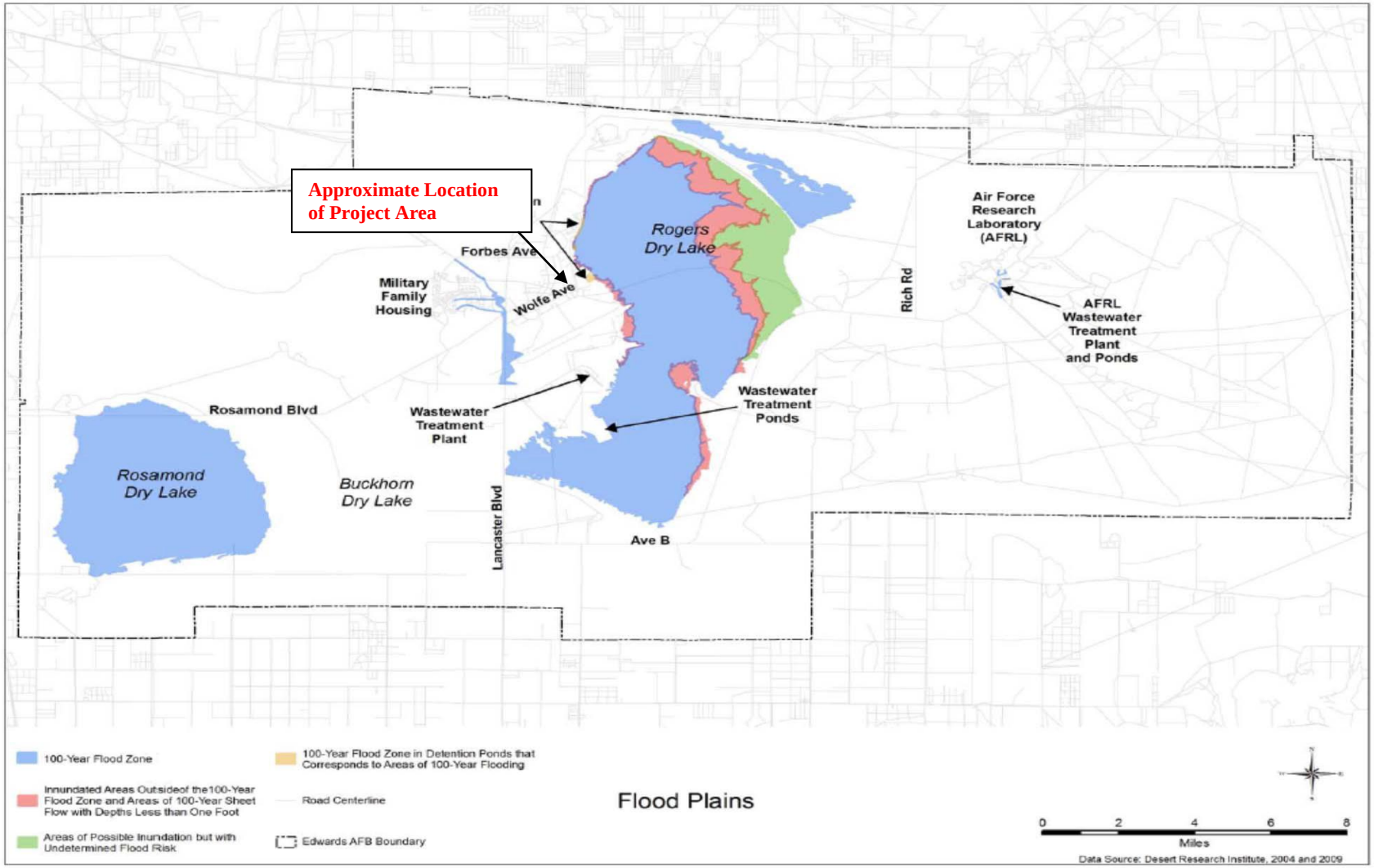
Figure 3-5. Floodplain Boundaries



Source: Edwards Air Force Base General Plan 2011

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3.3.3 Water Supply, Distribution and Quality

3.3.3.1 Water Supply

The primary sources of potable water for Edwards AFB include groundwater from on-site wells and water from Antelope Valley East Kern (AVEK) Water Agency originating from the Sacramento Delta. Edwards AFB purchases potable water from the AVEK Water Agency through a water distribution system located in Boron. The transmission line that transports AVEK water to the base runs parallel to State Highway 58 and enters the base at the North Gate. The transferring of water and additional water treatment is conducted at Building 4004. The water is distributed simultaneously to a 1 million-gallon storage tank (Building 4948) and a 750,000-gallon storage tank (Building 4940). These tanks supply the water by gravity to the North and Main Base areas, including the flightline.

Four on-base well fields also provide water to Edwards AFB as follows:

- South Base Well Field – contains five potable wells, one non-potable well and a more recent well completed in 2009;
- South Track Well Field – contains two potable wells;
- AFRL Well Field – contains four potable wells, one of which is not used due to high arsenic levels; and
- Graham Ranch Well Field – contains one potable well and one non-potable well.

Table 3-6 details the current potable water capacities from AVEK and the South Base and South Track Well Fields as specified in the Edwards AFB General Plan 2011.

Table 3-6. Potable Water Capacity

Water Source	Capacity
Antelope Valley-East Kern Water District	8 acre-feet[1]/day
South Base Well Field	9,730 gpm[2] (14.01 mgd[3])
South Track Well Field	3,000 gpm (4.32 mgd)

[1] 1 acre-foot = 325,851 gallons
[2] gpm = gallons per minute
[3] mgd = million gallons per day

The jet engine testing that takes place at Edwards AFB in Building 3804 uses water for cooling during the testing process. Water is supplied by a 50,000-gallon storage tank located outside the building. After testing, the residual test water is collected, recycled and reused for subsequent jet engine test cooling. The water tank is not metered so the total volume used for jet engine testing is not known (Richard Norris/Edwards AFB, personal communication 5 March 2012).

3.3.3.2 Water Distribution

The South Track and South Base wells are connected at each well to a 20-inch water transmission line and some are also connected at each well to a parallel 14-inch water

transmission line. Both transmission lines fill two 250,000-gallon storage tanks (790 and 793) at the South Base booster station (Building 791). Water is then disinfected at booster station Building 791 and pumped via four pumps to the three storage tanks located west of Military Family Housing. From there, water is distributed via gravity flow to base housing, shopping areas and South Base.

The original water storage and distribution system has undergone rehabilitation with individual sections cleaned, repaired or totally replaced. However, some sections of the current system still frequently leak due to age, particularly along the flightline area (Edwards AFB General Plan, dated 2011).

Edwards AFB developed a reclaimed water system that irrigates the golf course, common lawn areas and ball fields at Arnold Park during the summer months. During the winter months, the reclaimed water is routed to evaporation ponds. The reclaimed water system is further discussed in Section 3.3.4, Wastewater Treatment.

3.3.3.3 Drinking Water Quality

The EPA's Office of Water establishes the groundwater and drinking water quality standards found in the National Primary Drinking Water Regulations (or primary standards) that are legally enforceable and apply to public water systems. Edwards AFB must also conform to the standards for drinking water set by the California Environmental Protection Agency (Cal-EPA). These standards are administered locally by the Lahontan RWQCB. Primary standards protect drinking water quality by limiting the levels of specific contaminants that can adversely affect public health and are known or anticipated to occur in public water systems.

The Bioenvironmental Engineering monitors groundwater quality, compliance of drinking water standards and assists the Base Civil Engineer (BCE) and Environmental Management with required environmental monitoring, identification and characterization of industrial wastewater discharges. It also conducts periodic sampling and analysis to ensure regulatory compliance and takes out-of-cycle samples for analysis at the request of the BCE and Environmental Management. Any accidental or intentional break in the water lines need to be identified/coordinated with the BCE and Bioenvironmental Engineering to prevent foreign materials (biological or chemical) from contaminating the Base water supply. Groundwater contaminated with petroleum products is not discharged into sanitary or storm sewers. The contaminated waters are pretreated prior to discharge (EAFBI 32-6).

3.3.4 Wastewater Treatment

3.3.4.1 Wastewater Treatment System

There are two types of wastewater sources on Edwards AFB. These sources are domestic and industrial. Domestic sources include sanitary uses and miscellaneous domestic chores. Industrial sources include industrial production, paint stripping, metal plating, maintenance and repair, aircraft and vehicle cleaning, power or heat plant operations, photographic processing, boiler and cooling water discharges and oil and solvent recovery operations, etc.

Treatment of wastewater at Edwards AFB is provided by two operating wastewater treatment plants (WWTPs). These two plants collect and treat wastewater for specific areas on base: Main Base, South Base, North Base and the AFRL, under waste discharge permits issued by the Lahontan RWQCB. The Board Order for the Main Base is No. 6-01-41.

The Main Base WWTP was completed in 1997 and treats wastewater generated at North Base, Main Base, NASA Dryden Flight Research Center complex and South Base areas. The facility average daily flow capacity is 2.5 mgd with a peak daily flow of 4.0 mgd. The plant is designed for a tertiary level of treatment, which allows for irrigation reuse through a reclaimed water system. Treated effluent from the wastewater treatment plant is discharged to evaporation ponds during the non-irrigation season. During irrigation season, treated effluent is transferred to the reclaimed water system for irrigation of the golf course and other landscaped areas. Excess flows in winter are discharged to the evaporation ponds.

The reclaimed water system consists of a pumping station at the treatment plant, an existing water line converted to the reclaimed water system, a 1.5 million gallon storage tank, a booster pump station and distribution lines to irrigated areas. The receiving waters are the groundwaters of the Lancaster Subbasin.

The existing JETC facility at Building 3804 is estimated to generate less than 0.5 million gallons per year of domestic wastewater from facility bathrooms, sinks, etc., which is routed to the Main Base WWTP. Additionally, the facility generates small volumes of hazardous wastewater during jet engine testing. On an annual basis, approximately 9,000 gallons of hazardous wastewater is generated at the test facility. After each test run, the hazardous wastewater is collected and stored in a 2,000-gallon storage tank for 90-day accumulation for up to 1,500 gallons. This hazardous wastewater is then collected along with other base-wide hazardous wastewater and sent off-site for disposal by Demmeno Kerdoon, a hazardous waste disposal company (personal communication with Cat McDonald/Edwards AFB, 1 March 2012).

3.3.4.2 Wastewater Treatment Standards

Wastewater conveyed to the WWTPs is required to meet specific pretreatment standards established by various regulating entities to ensure that pollutants entering or passing through the WWTP will not have an adverse effect on the treatment process or contaminate sludge (EAFBI 32-6).

Excessive discharges of some wastes into the wastewater system are not permitted, unless approved by the BCE, Environmental Management and Bioenvironmental Engineering. A complete listing of prohibited wastes is provided in EAFBI 32-6.

Buildings that generate industrial wastewater are required to process an AFFTC Form 5528, *Industrial Wastewater Discharge Permit*, prior to discharging any wastewater. The permit must be approved by the BCE, Environmental Management and Bioenvironmental Engineering and is applicable to all dischargers of industrial wastewater. AFFTC Form 5528 ensures compliance with required hazardous substances handling protocols and should remove significant impacts caused by industrial wastewater to the WWTPs. This requirement does not apply to the existing

JETC facility since all non-domestic wastewater is collected and sent off-site for disposal by a hazardous waste disposal company.

3.3.5 Storm Water

Storm water generated on-site is collected and conveyed through a series of earthen channels as well as storm drains in some developed areas. On the Main Base, these conveyances direct runoff from west to east into Rogers Dry Lake Bed or to the storm water retention ponds east of the Main Base flightline.

Storm water runoff from the Edwards AFB is not subject to NPDES storm water regulations under CWA Section 402 because the base does not discharge runoff to a regulated water body under the CWA (i.e., Waters of the U.S.). Therefore, coverage under California's NPDES storm water general permits for industrial and construction activities is not required at Edwards AFB. However, Edwards AFB implements storm water best management practices (BMPs) to control pollutants in storm water runoff from industrial activities, as outlined in the SWPPP for Edwards AFB (June 2002). Potential storm water pollutants at the existing JETC facility (Building 3804) as listed in the SWPPP include grease, oil, paints, carbon particulate from exhaust, waste fluids, soaps, fuel residuals and contact cooling water. The types of BMPs that are implemented to control pollutants from entering storm water include: good housekeeping practices, preventive maintenance, spill prevention and response procedures, proper materials handling and storage practices, facility personnel training; proper waste handling procedures and erosion control. Additionally, containment structures are used to control storm water pollution and include containment dikes, curbs, drainage ditches and retention ponds.

Additionally, during construction of new facilities, Edwards AFB requires contractors to implement construction activity BMPs to control erosion and other construction site pollutants from entering storm water runoff. For construction projects on leased property, where the construction site is larger than five acres, each project must provide a site-specific Pollution Prevention Plan (AFFTC 1998f).

As more undeveloped (pervious) land at Edwards AFB becomes developed (impervious land), existing storm water drainage patterns may change and storm water runoff volume and velocity may increase, if not adequately addressed during project design. Therefore, engineering and development designs for Edwards AFB facilities that exceed 5,000 square feet must incorporate storm water runoff requirements of Section 438 of EISA (2007). EPA's *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act* (December 2009) provides design options and methods for maintaining a site's pre-development flow characteristics (e.g., temperature, rate, during and volume of flow), including retaining rainfall on-site through infiltration, evaporation/ transpiration and reuse. Compliance with EISA Section 438 can be achieved by a variety of stormwater management practices often referred to as "green infrastructure" or "low impact development" practices, including reducing impervious surfaces, using vegetative practices, porous pavements, cisterns and green roofs. These practices help retain or infiltrate storm water on-site to minimize water quality and hydrologic impacts to downstream receiving waters.

3.4 Hazardous Materials and Hazardous Waste

A hazardous material is any material whose physical, chemical, or biological characteristics, quantity, or concentration may cause or contribute to adverse effects in organisms of their offspring; pose a substantial present or future danger to the environment; or result in damage to or loss of equipment, property, or personnel.

Hazardous wastes are those substances that have been "abandoned, recycled, or are inherently waste like" and which (because of their quantity, concentration, or characteristics) have the potential to cause an increase in mortality or serious irreversible illness, or pose a substantial hazard to human health or the environment if improperly treated, stored, transported and/or disposed.

Solid waste refers to nonhazardous garbage, refuse, sludge and any other discarded solid material resulting from residential, commercial and industrial activities or operations. Solid waste can be classified as construction/demolition waste, nonhazardous recyclable waste, or nonhazardous nonrecyclable waste.

For purposes of this analysis, the terms hazardous material and hazardous waste are those substances as defined by the *Comprehensive Environmental Response, Compensation and Liability Act of 1980* (CERCLA) and the *Resource Conservation and Recovery Act of 1976 (*RCRA).

3.4.1 Regulatory Requirements/Guidance

The RCRA (42 USC 6901) is administered by the EPA. It regulates the handling, transport, storage, treatment and disposal of solid and hazardous waste. It places responsibility for hazardous waste on facilities generating the waste and requires them to meet the various standards regarding personnel training, facility inspections, waste identification and analysis, emergency response planning and recordkeeping.

The CERCLA (42 USC 9601) provides broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. The Act authorizes short-term removal actions and long-term remedial response actions. The Act establishes prohibitions and requirements concerning closed and abandoned hazardous waste sites, provide for liability of persons responsible for releases of hazardous waste at these sites and establishes a trust fund to provide for cleanup when no responsible party could be identified.

The Federal Facility Compliance Act of 1992 (FFCA) (Public Law 102-386) waives sovereign immunity with respect to federal, state and local procedural and substantive requirements relating to the RCRA solid and hazardous waste regulations. The FFCA waives sovereign immunity and authorizes the EPA and states to assess civil and administrative penalties and fines against federal facilities and criminal fines and imprisonment against violating agents and employees of federal agencies. The "cradle to grave" approach of most of the RCRA now applies to both private industries and federal facilities.

AFI 32-7086, *Hazardous Materials Management*, establishes procedures and standards that govern management of hazardous materials throughout the AF. It applies to all AF personnel who procure, use, or dispose of hazardous materials.

AFFTCI 23-1, *Hazardous Material Management Program (HMMP)*, implements AFI 32-7086, *Hazardous Materials Management*. It provides guidance for all AFFTC, Base contractor and tenant organization personnel on Edwards AFB and establishes responsibilities and outlines procedures essential to operating an effective HMMP. The AFFTCI details standards regarding implementation of the HMMP and is readily available to all AF and contractor personnel procuring hazardous materials from the Hazardous Materials Pharmacy (HMP). A key component of the HMMP is the Hazardous Materials Integrated Process Team. It is comprised of specialists from Environmental Management, Procurement, Safety, Supply and Bioenvironmental Engineering who are responsible for developing and implementing policies concerning the HMMP.

AFFTCI 32-19, *Hazardous Material Management Process*, ensures the AFFTC remains in compliance with all applicable federal, state, local and AF regulations and laws regarding hazardous materials management. The Instruction involves the use of information systems and positive control of hazardous material to minimize occupational exposures, monitor and minimize environmental releases and minimize hazardous waste disposal. The hazardous materials processes will be reviewed by the workplace supervisor, Environmental Management, Ground Safety and Bioenvironmental Engineering to ensure the least occupational and environmentally hazardous materials are used. All hazardous material transactions occur using the most current automated data system fielded for use at the base.

The Edwards AFB Hazardous Waste Management Plan (HWMP) (July 2010) supports AF directives and is intended to ensure compliance with applicable federal, state and local regulations. The objective of the HWMP is to provide sufficient administrative direction and instructions for originators of RCRA and non-RCRA wastes to properly characterize, package, label, store, treat, handle and transport hazardous waste at Edwards AFB. The goals are to ensure compliance with the applicable federal, state and local hazardous waste regulations; simplify administrative procedures; and reduce pollution and environmental impacts through improved waste management practices.

The Base Solid Waste Management Plan (AFFTC 1999b) describes Environmental Management's functional management of municipal solid waste disposal and recycling on Edwards AFB. The purpose of the Plan is to comply with federal, state and local regulations and AF policy and guidance on the management of nonhazardous municipal solid waste.

3.4.2 Hazardous Materials

Edwards AFB uses a wide variety of hazardous materials in support of research activities on the base and its mission requirement to support all types of inventory aircraft. Hazardous materials are used for aircraft repair and maintenance, aircraft launch and recovery, building remodeling and construction. Some of the most commonly used hazardous materials include jet and motor fuel, other types of petroleum products, paints, thinners, adhesives, cleaners, lead-acid batteries, hydraulic fluids and halogenated and non-halogenated solvents (USAF 1995).

Edwards AFB uses the HMP concept to issue hazardous materials for use by the AF personnel. The HMP monitors shelf life and tracks usage of hazardous materials on base. Purchases of hazardous materials, as well as requests for use of specific hazardous materials, are processed through the main Hazardous Material Cell (HMC), located in Building 3735. One common database is used to manage issued hazardous material products. Hazardous materials purchased through the HMC are bar code labeled upon their arrival at Supply Central Receiving and distributed to the various satellite issue points, or Hazardous Materials Distribution Support Centers (HMDSCs), located throughout Edwards AFB. Implementation of the HMP concept reduces the volume of hazardous materials purchased and hazardous wastes generated through improved materials management.

Licensing all users of hazardous materials is critical to the implementation of the HMP, because it requires users to qualify and quantify their need for these materials based on AF Technical Orders and best practices. In doing so, it controls and minimizes the distribution and use of hazardous materials. As a part of the HMP process, AF personnel are required to return unused portions of the hazardous materials/products to their HMDSC for subsequent use/disposal. The level of materials control established by the HMP has effectively reduced the amount of hazardous materials available for use at Edwards AFB.

3.4.3 Hazardous Waste

The use of hazardous materials results in generation of hazardous waste (e.g., paint waste, used oil, contaminated rages, etc.) and requires proper handling. The EPA enforces the RCRA (40 CFR 260-272), which provides guidelines for the generation, storage, transportation and disposal of hazardous waste. The Cal-EPA enforces hazardous waste laws embodied in 22 California Code of Regulations (CCR) Chapters 10-20 and the California Health and Safety Code (Section 25100). Environmental Management manages hazardous waste accumulation. Guidelines used by Edwards AFB include the Edwards AFB HWMP, which was prepared in accordance with AFI 32-7042, *Solid and Hazardous Waste Compliance*. It establishes procedures to achieve compliance with applicable federal, state and local regulations for hazardous waste management, except munitions, explosives, biohazard and radioactive waste.[24] Specifically, it contains requirements for solid and hazardous waste characterization, training, accumulation, turn-in and disposal, as well as procedures for inspections, permits and recordkeeping.

Hazardous waste from base operations is collected in hazardous waste accumulation points, which include both initial accumulation points (IAPs) and 90-day accumulation sites (ACCSs). An IAP is an area at or near the point of hazardous waste generation, where hazardous wastes may be accumulated until they are sent to either an ACCS or the Hazardous Waste Support Facility (HWSF) (a facility permitted to store hazardous wastes for up to one year). The HWSF at Edwards AFB is the final stage of on-base management of hazardous waste. The HWSF is managed by Environmental Management under a service contract and operates as a hazardous waste storage facility in Building 4916. This facility is permitted to temporarily store (up to one year) hazardous waste in accordance with Title 22 CCR Section 66270 under a Part B Permit. Wastes accumulated at IAPs and ACCs throughout the base are transported to the HWSF prior to shipment off-Base for treatment, storage, or disposal.

[24] The applicable hazardous waste regulations are in Subtitle C, 40 CFR 260-272.

3.4.4 Solid Waste

A composting facility is operated at the Main Base Landfill. It uses Ag-bags for large-scale in-bag composting to convert greenwaste (e.g., grass clippings, leaves, shrubbery trimmings, tree prunings, home garden refuse and nontreated wood products, etc.) collected within the military family housing area into finished compost product. Screener, grinder and bagger equipment are used to prepare and process the greenwaste, which is collected at the curbside.

Edwards AFB operates a nonhazardous (municipal solid) waste landfill within the Main Base area. At current disposal rates, the landfill is expected to reach permitted capacity in the year 2019. Due to the volume of construction/demolition waste generated on base, most current construction contracts require the contractor to dispose of such wastes at an approved off-base landfill in order to reduce the impacts to the Main Base Landfill.

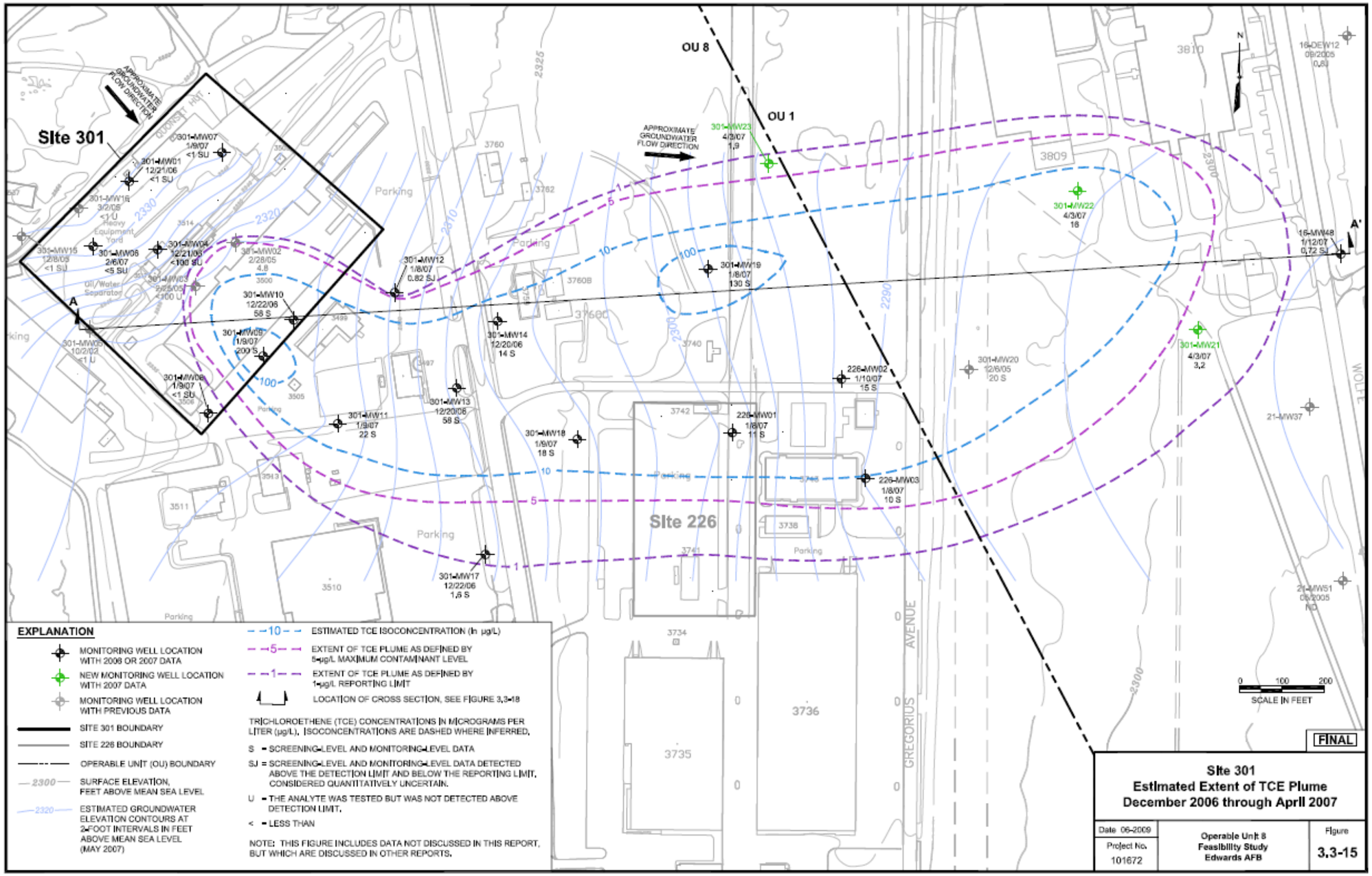
3.4.5 Environmental Restoration Program

Previous releases of hazardous chemicals during base operations resulted in both soil and groundwater contamination on Edwards AFB. Contaminated soil or groundwater requires physical removal or extensive remediation to ensure the protection of public health and safety. The remediation of contaminated sites is conducted under the Environmental Restoration Program (ERP), which was established to identify, investigate, assess and clean up hazardous waste at former storage and disposal sites as required by CERCLA and RCRA. In order to conduct remediation of the sites, Edwards AFB is divided into ERP management areas termed operable units.

The proposed project site is located adjacent to Building 3810, within the Main Base Flightline, Operable Unit 1 (OU1). A total of 48 ERP sites are identified within OU1. None of these sites are within the boundaries of the proposed project site. However, a trichloroethylene (TCE) plume from Operable Unit 8 (OU8) Site 301 migrated eastward to the area beneath the proposed project site (see Figure 3-6). This soil and groundwater contamination plume was caused by the storage of hazardous wastes generated by the Protective Coating and Carpentry shops in Building 3500.

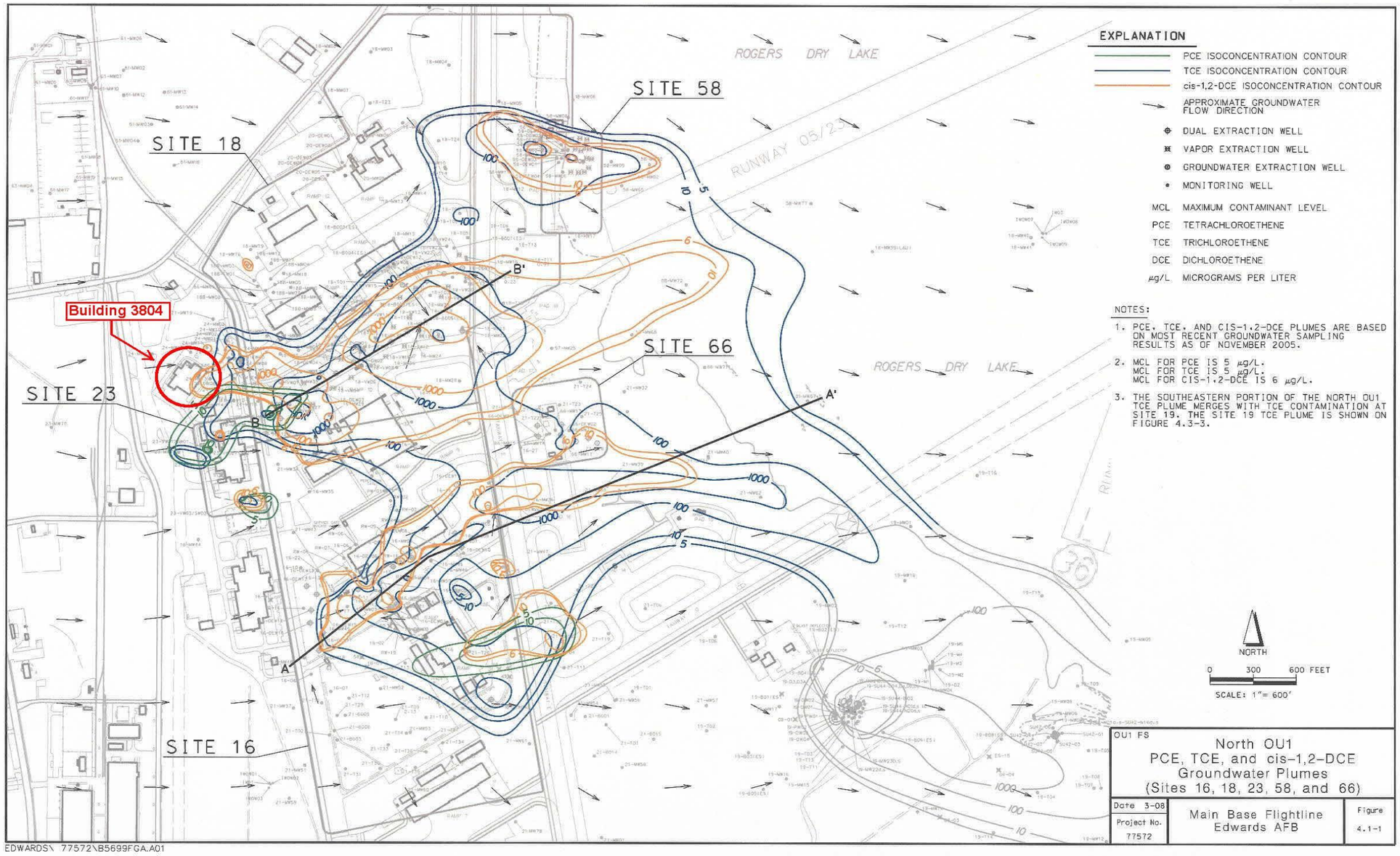
The proposed project site is also located near Building 3804, the existing JETC facility. The existing JETC facility is located above the North OU1 groundwater contamination plume. Sources of the groundwater contamination in the North OU1 Plume include underground storage tanks, drums, aircraft or pipelines that contain gasoline, diesel fuel, or solvents used in aircraft maintenance and engine testing. Figure 3-7 shows the location and extent of the plume. This soil and groundwater contamination plume was caused by the storage of hazardous wastes generated by the Protective Coating and Carpentry shops in Building 3500.

Figure 3-6. OU8 Site 301 TCE Plume



Source: Final Feasibility Study, North Main Base, Operable Unit 8, Volume I, June 2009

Figure 3-7. OU1 Site Plume



Source: Source of the figure is Final Feasibility Study, Main Base Flightline, Operable Unit No. 1, Volume I, March 2008

3.5 Cultural Resources

Cultural resources are defined by AFI 32-7065, *Cultural Resources Management*, as any historical, archaeological or Native American artifacts and properties of interest. Cultural resources at Edwards AFB include archaeological resources (including those from prehistoric and historic periods) and historic period resources (including historic period structures and objects).

The ICRMP is a five-year plan reviewed and updated annually to provide effective management of cultural resources at Edwards AFB. Within the ICRMP, Edwards AFB is divided into five management regions. The project area is located within the Central Base Management Region (MR3). MR3 encompasses 117,216 acres within Edwards AFB.

3.5.1 Regulatory Requirements/Guidance

The NHPA of 1966, as amended (16 USC 470 et seq.), provides for the establishment of the National Register and authorized the establishment of criteria to determine the eligibility of cultural sites for listing on the National Register. Section 106 of the NHPA requires federal agencies to evaluate the effects of their activities and programs on eligible cultural resources (which include prehistoric and historic archaeological resources, historic resources and traditional cultural places). Section 110 of the NHPA directs federal agencies to undertake actions necessary to minimize harm to cultural resources under their ownership or control, or affected by their activities and programs. Compliance with 16 USC 470 et seq., NHPA; 36 CFR Part 800, *Protection of Historic Properties*; and AFI 32-7065, *Cultural Resources Management* at Edwards AFB is coordinated by the Base Historic Preservation Officer (BHPO).

The Native American Graves Protection and Repatriation Act (25 USC 3001 et seq.) requires federal agencies and institutions (i.e., museums) that receive federal funding to inventory their collections of Native American human remains, funerary objects, sacred objects and objects of cultural patrimony. Native Americans must be given the opportunity to reclaim these items. It requires consultations with Native Americans regarding the avoidance of archaeological burial sites. It requires halting excavation and consulting with representatives of local Native American groups if a burial is encountered in the course of archaeological or other excavations. The Act also makes it illegal for anyone to buy or sell Native American human remains or sacred objects.

The Antiquities Act of 1906 (16 USC 431-433) prohibits the excavation of antiquities from public lands without a permit from the Secretary of the Interior.

The Archaeological Resources Protection Act (ARPA) (16 USC 469) addresses the growing concern about the plundering of archaeological and historic sites. The Act makes it illegal to remove any archaeological resources from federal or Indian lands without a permit. Arrowheads lying on the surface are the only exception. Violations of the ARPA can result in fines of up to $250,000 and up to five years of imprisonment.

The Archaeological and Historic Preservation Act of 1974 requires all agencies to report to the Secretary of the Interior if any of their projects may cause the loss of "significant scientific, prehistorical, historical, or archaeological data," gives them the choice of recovering threatened

data themselves or asking the Department of the Interior to do it for them and it authorizes them to transfer up to 1% of the cost of the project to the Department of the Interior to support salvage.

The American Indian Religious Freedom Act (42 USC 1966) recognizes and protects the religious freedoms of Native Americans as an integral part of their culture, tradition and heritage. The Act preserves the right of access by Native Americans to sacred sites, to use and possess sacred objects and to freely worship through ceremonial and traditional rites.

3.5.2 Historic Context

3.5.2.1 Prehistoric

A number of Native American groups are known ethnographically to have used the Antelope Valley, including the Kawaiisu, Tataviam, Kitanemuk and Vanyume or Desert Serrano. Additional information on these groups can be found in the Cultural Resources Overview and Management Plan of Edwards AFB, California, Volume 1, Overview of the Prehistoric Cultural Resources (Earle et al. 1997).

Prehistoric period sites includes villages, temporary camps, rock shelters, milling stations, lithic deposits, quarries, cremations, rock features and rock art.

3.5.2.2 Historic Period

Historic land use in the Antelope Valley was limited to exploration until the middle of the 19th century. During the late 19th and early 20th centuries, land use activity in the area, which is now part of Edwards AFB, included mining and the development of railroads, ranches and homesteads. The area was first used by the military in 1928 and a bombing and gunnery range was formally established at Rogers Dry Lake in 1934.

Until the 1860s, the region surrounding Edwards AFB was considered a remote wilderness by California settlers. This changed with the establishment of mining operations in areas surrounding the Antelope Valley (Earle et al. 1998). Miners in the Edwards AFB region pursued a variety of resources including copper, gold, mud and oil. The first known mining claim within the Base area was filed in 1884, following the discovery of copper deposits 3 miles south of Kramer Station (Bupp et al. 1996).

The Atchison, Topeka and Santa Fe railroad line, located north of the Base, originally ran through what is now Main Base on Edwards AFB, crossed Rogers Dry Lake and then ran northeast to Kramer Junction. Construction of the original line between Mojave and Needles by Southern Pacific Railroad began on 14 February 1882. In 1884, Southern Pacific Railroad leased the Mojave to Needles line to the Santa Fe Railroad. Thirteen years later, in 1897, Santa Fe Railroad acquired the line outright (Earle et al. 1998).

In 1885, the first homestead entries in the Edwards AFB area were made just to the west of Rosamond Dry Lake. However, desert land entries, authorized by the Desert Land Act, led to successful patents more frequently than homestead claims until 1910. Homestead entries increased sharply in numbers after 1919 as war veterans looking for their own land swelled the

numbers of applicants. Nevertheless, the number of homestead entries that eventually received patents was considerably lower, varying between 6 and 10 per year (Earle et al. 1998).

Edwards AFB, then known as Hap Arnold's Camp and later the Muroc Bombing and Gunnery Range, was established in 1934 as a bombing range (Wessel and Wessel 1990). The Muroc Bombing and Gunnery Range was operated out of a tent camp on the east shore of Rogers Dry Lake by March Field, Riverside, California.

In 1941, the Muroc Bombing and Gunnery Range headquarters moved to the west shore of Rogers Dry Lake (modern South Base), immediately south of the townsite of Muroc. In 1942, Muroc Bombing and Gunnery Range was made a separate post, independent of March Field and was renamed Muroc Army Air Base (Young 1987). It was renamed again in 1943, becoming Muroc Army Air Field. In 1942, a separate facility, Muroc Flight Test Base (now known as North Base), was established (Hudlow 1995a).

In 1947, the bombing range, by then known as Muroc Army Air Field, was combined with Muroc Flight Test Base to form Muroc AFB (Hudlow 1995a). The base's bombing range function was largely abandoned after World War II in order to concentrate on flight test. In 1949, Muroc AFB was renamed Edwards AFB in commemoration of Captain Glen W. Edwards who was killed flying second seat to Major Daniel Forbes in a Northrop YB-49 Flying Wing (Young 1987). In the mid-1950s, the majority of the Base operations moved to new facilities constructed at what is now Main Base (Young 1984).

3.5.3 Archaeological Resources

According to the November 2011 ICRMP, 4,657 archaeological sites had been identified on Edwards AFB. Of these, 3,429 sites have been found eligible for listing on the National Register or have not yet been evaluated. One thousand five hundred and twenty four (1,524) sites represent the prehistoric period and 1,915 sites date to the historic period. Within MR3, a total of 1,195 sites have been recorded. Of these, 563 are prehistoric sites and 632 are historic period sites. Prehistoric period sites include villages, temporary camps, rock shelters, milling stations, lithic deposits, quarries, cremations, rock features and rock art. Historic period archaeological sites include refuse deposits, rock cairns, railroad grades, roads and trails, abandoned mines and homesteads, buildings and facilities, rock alignments, wells and military sites.

3.5.4 Historic Structures

According to the November 2011 ICRMP, 2,992 historic structures on Edwards AFB are tracked by the Edwards AFB Cultural Resources program. Evaluations have been performed for 848 of these structures. Of these, 2,151 have not been evaluated, 727 have been determined ineligible and 113 have been determined eligible for nomination to the National Register of Historic Places (NRHP). Only one resource, the Rogers Dry Lakebed, is listed on the NRHP and has been designated as a National Historic Landmark.

Within Edwards AFB, there are also five individual historic districts: Jet Propulsion Laboratory, Philips Laboratory, X-15 Engine Test Complex, North Base and South Base Sled Track.

The project is located within the Main Base of Edwards AFB. The project area is adjacent to Building 3804, which was recommended eligible for listing to the NRHP in 2008 under Criterion C for its distinctive engineering qualities of type period, or method of construction. The building and test cells were engineered and acoustically treated to withstand high-thrust jet blasts and extreme sound and pressure fluctuations.

The project area is located near, but not adjacent to, a newly proposed Power Plant Branch Facility Historic District, which consists of Buildings 3804 and 3806 (Ref. 2011 Proposed ICRMP Update). The proposed district derives its significance from its association with the overall research, design, testing and evaluation (RDT&E) mission of Edwards AFB. Building 3804 supported by Building 3806 (a non-potable water tank) tested every type of aircraft engine used at Edwards AFB since the late 1950s. The Power Plant Branch Facility supplied an important function and is an integral part of the RDT&E infrastructure at Edwards AFB. The Power Plant Branch Facility Historic District was recommended in 2011. For the purposes of this EA, adverse effects to the Power Plant Branch Facility Historic District as a result of the proposed action will not occur. However, if Alternative B is decided to be the preferred action, a Section 106 consultation is recommended.

3.5.5 Traditional Cultural Places

There are no identified traditional cultural places on Edwards AFB. These resources would include cultural landscapes, sacred landscape features and/or places of cultural significance. However, Edwards AFB consults with American Indian tribes to deal with issues concerning the *Native American Graves Protection Repatriation Act of 1990*. Edwards AFB is also aware of the importance of traditional cultural places and sacred sites and an effort to identify those that require American Indian consultation has been completed under Section 106 of the NHPA. There are four federally recognized tribes that may be consulting or interested parties: Chemehuevi Reservation, Colorado River Agency; Colorado Indian Tribes Tribal Council; Morongo Band of Mission Indians; and San Manuel Band of Mission Indians. Additionally, there are nonrecognized groups that may be interested parties. These groups include the Kawaiisu Tribal Council, the Tehachapi Indian Tribe (Kawaiisu), Native American Heritage Preservation Council (Kawaiisu) and the Kern Valley Indian Community (Tubatulabal/Kawaiisu/Koso/Yokut).

3.5.6 Paleontological Resources

Over 700 paleontologic localities have been identified on Edwards AFB. Most of the recorded specimens consist of isolated fragments of tooth enamel or bone that are not securely dated. Irvingtonian fossil localities have been identified on the slopes of Leuhman Ridge, Haystack Butte and Jackrabbit Hill on Edwards AFB while, "Rancholabrean fossil localities are numerous in the Edwards AFB region" (Rhode and Lancaster 1996).

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Air Quality

4.1.1 Alternative A Impacts

Alternative A, the proposed action involves the construction and operation of a new 35,000 square foot JETC facility and associated 15,000 square foot storage barn on the Main Base, adjacent to Building 3810.

4.1.1.1 Direct and Indirect Emissions Associated with the Proposed Action

Direct emissions associated with the proposed action include construction and operational emissions. Indirect emissions from the proposed action include construction worker commuting trips. No foreseeable indirect emissions are associated with the operational side because an increase in the current work force is not anticipated. The existing workforce is expected to transition into the new JETC as older projects conclude and are replaced with newer projects. This transition is expected to keep the existing operational workforce at current levels resulting in no new workers.

Proposed construction activities generate fugitive dust emissions (i.e., $PM_{2.5}$ and PM_{10}). These emissions may be estimated by applying emission factors for soil transfer operations are based on equations from Section 13.2.4 of AP-42. The proposed JETC earth moving activities would involve approximately three weeks of excavation and backfill activities. Other aspects of the facility installation are expected to take up to six months and involve the use portable air compressors and/or use of on-site electrical power. Use of associated motor vehicles and construction equipment would also generate criteria pollutant emissions. Off-road construction equipment is assumed to consist of EPA-certified Tier III engines. EPA provides criteria pollutant emission factors for this equipment. Emissions associated with on-road trucks such as water trucks and haul trucks apply emission factors from the EPA MOBILE 6.2 model. Indirect emissions associated with Construction workers commute is estimated at 30 miles per day, five days per week for six months. Vehicular emission factors were obtained from the Air Emissions Factor Guide to Air Force Mobile Sources, December 2009.

Following construction, operational emissions from the JETC would be generated. Direct emissions result from the operation and/or maintenance of aircraft engine testing; the use of the boiler and maintenance activities. The engine testing workload in these test cells associated with this alternative is approximately 60 engines per year. Edwards AFB uses computer software system to cycle the aircraft through operational run modes at various power settings such as idle, approach, military, takeoff and afterburner power settings and to monitor the aircraft engine performance during the entire test period. The construction, mobile and stationary direct and indirect emissions are summarized in Table 4-1. The stationary source operational emissions are subject to NSR. NSR requires a BACT review and offset assessment. Toxics are reviewed and assessed through the AB 2588 program and EPA NESHAP regulations. The proposed action is located in Kern County and is regulated by EKAPCD NSR Rule 210.1. Because compliance with NSR requirements, AB 2588 and EPA NESHAPs is assessed for the new JETC, no

significant adverse effects on air quality are expected. This conclusion is based on discussion and analysis in the following sections.

Because the proposed action involves the construction of a JETC, an ATC permit from the EKAPCD pursuant to Rule 210.1 will be required. The purpose of Rule 210.1 is to:

- Provide for preconstruction review of new and modified stationary sources of affected pollutants to ensure emissions do not interfere with attainment of AAQS;
- Ensure appropriate new and modified sources of affected pollutants are constructed with BACT; and
- Provide for no significant net increase in emissions from new and modified stationary sources for all non-attainment pollutants and their precursors.

To perform a general NEPA assessment and to assist in the NSR determination, emission factors provided by AFCEE were applied for estimating jet engine testing emissions. For estimating boiler emissions, best available control technology emissions factors for NOx and CO were provided from the South Coast Air Quality Management District (SCAQMD). Other criteria pollutant emission applied factors from AP 42, Fifth Edition, Volume I, Chapter 1: External Combustion Sources, Section 1.4 – Natural Gas Combustion.

40 CFR Part 52.21, PSD, provides for preconstruction review of major sources and major modifications involving attainment (or unclassified) pollutants for the purpose of insuring proposed emissions will not cause an exceedance of NAAQS. 40 CFR Part 52.21(b)(23)(i) defines significant to mean, in reference to a net emissions increase or the potential of a source to emit any of the following pollutants, a rate of emissions that would equal or exceed any of the following pollutant and emissions Rate:

- Carbon monoxide: 100 tons per year (tpy)
- Nitrogen oxides: 40 tpy
- Sulfur dioxide: 40 tpy
- Particulate matter: 25 tpy of particulate matter emissions
- PM_{10}: 15 tpy
- $PM_{2.5}$: 10 tpy of direct $PM_{2.5}$emissions; 40 tpy of sulfur dioxide emissions; 40 tpy of nitrogen oxide emissions unless demonstrated not to be a $PM_{2.5}$precursor under paragraph (b)(50) of this section
- Ozone: 40 tpy of volatile organic compounds or nitrogen oxides

As detailed in Table 4-1, a PSD permit is not required because the emission generated by the proposed action fall below the PSD thresholds.

Details of the construction and operational emission calculations and methodology are provided in Appendix 1. Summaries of the direct and indirect construction and operational emissions are

detailed in Table 4-1. The emissions trigger EKAPCD NSR but do not exceed EPA, CEQA and PSD thresholds.

Table 4-1. Summary Table for Alternative A Direct and Indirect Emissions

	Criteria Pollutant (In Tons)						Greenhouse Gas Pollutants (in metric tons)		
	NOx	**CO**	**VOCs**	**PM_{10}**	**$PM_{2.5}$**	**SOx**	**CO_2**	**CH_4 (in CO_2e)**	**N_20 (in CO_2e)**
Alternative A									
Construction	1.60	0.77	0.05	0.13	0.05	0.00	311.23		
JETC	17.55	3.74	2.01	0.42	0.32	0.42	1,142.25	0.78	9.99
Boiler	0.08	0.45	0.03	0.04	0.04	0.08	639.11	2.78	2.24
Totals (increase to baseline):	**19.23**	**4.95**	**2.10**	**0.60**	**0.41**	**0.51**	**2,108.38**		
Baseline (No Action Alternative)	**24.96**	**22.42**	**11.25**	**4.98**	**4.88**	**4.05**	**9,907.48**		
Percent Difference	**77.0%**	**22.1%**	**18.7%**	**12.0%**	**8.4%**	**12.6%**	**21.3%**		

Notes:

NOx: Oxides of Nitrogen
CO: Carbon Monoxide
VOCs: Volatile Organic Compound as total hydro carbons
PM_{10} particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$ particulate matter less than or equal to 2.5 microns in diameter
SOx: Oxides of sulfur
N_2O Nitrous oxide
CO_2 Carbon Dioxide
CO_2e carbon dioxide equivalent
CH_4 Methane

4.1.1.2 Best Available Control Technology

JETC:

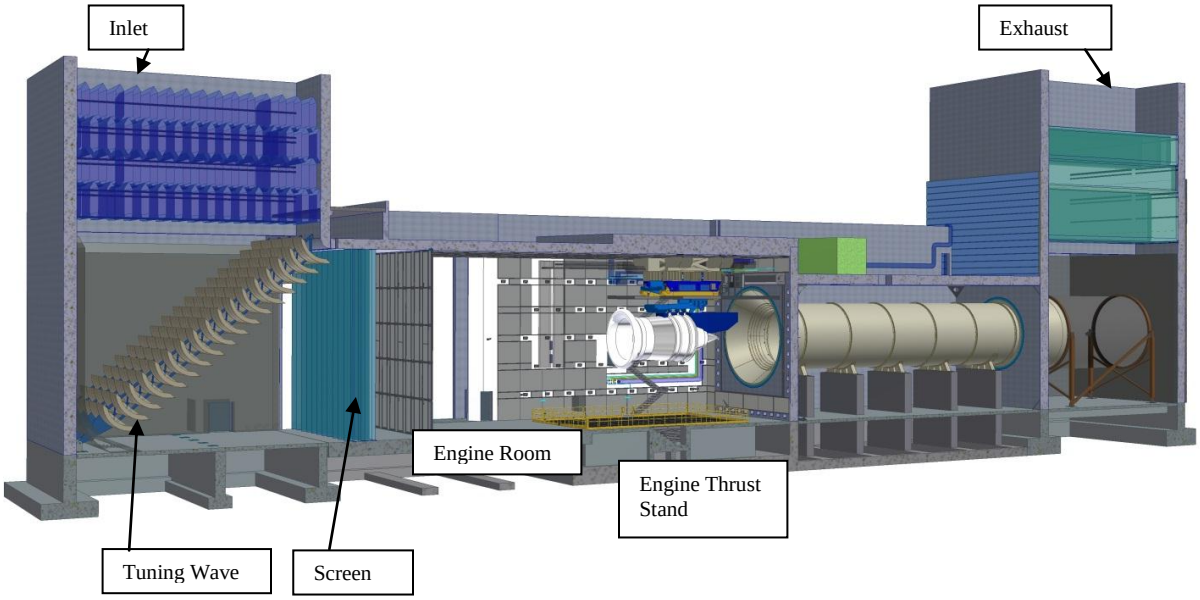
BACT cannot be determined to be less stringent than the emission controls required by any applicable local, state or federal law or regulation unless the applicant demonstrates that such limitations are not achievable. Application of BACT cannot result in the emission of any pollutant exceeding emissions allowed by any applicable New Source Performance Standard or NESHAP. BACT is the most stringent emission limitation or control technique:

- That is achieved in practice for such emissions unit and class of source;
- Any other emission limitation, control device, alternate basic equipment, or different fuel or process found to be technologically feasible for such class or category of source or for a specific source and cost effective as determined by EKAPCD policy; or
- That is contained in any SIP approved by EPA for such emissions unit category and class of source.

However, BACT may not apply if there is not a currently achievable limitation or control technique available.

A typical jet engine test cell is illustrated on Figure 4-1.

Figure 4-1. Typical Test Cell



In 2007, Tinker AFB performed a BACT analysis for a proposed JETC using the "top-down" methodology in accordance with EPA guidance in the draft document entitled New Source Review Workshop Manual (October 1990). After discussion with the JETC propulsion personnel, this BACT analysis remains consistent for the proposed Edwards JETC.

The top-down approach consisted of the following five steps:

- Identified all control technologies, including inherently lower emitting processes and practices, add-on control equipment, or combination of inherently lower emitting processes and practices and add-on control equipment.
- Eliminated technically infeasible or technically difficult options based on physical, chemical and engineering principles.
- Ranked the remaining control options by control effectiveness, expected emission reduction, energy impacts, environmental impacts and economic impacts.
- Evaluated most effective controls and documented results. Determined the economic, energy and environmental impacts of the control technology on a case-by-case basis.
- Selected the most effective option not rejected as the BACT.

The sources of information applied in the BACT analysis for the proposed project included the following:

- Review of the most stringent BACT-Prevention of Significant Deterioration (PSD) control measures for testing of aircraft jet engines in a jet engine test cell approved in the past 10 years by various states, as listed in EPA's Reasonably Available Control Technology /BACT/ Lowest Achievable Emission Rate Clearinghouse.

- Nitrogen Oxide Emissions and Their Control From Uninstalled Aircraft Engines in Enclosed Test Cell, Joint EPA - U.S. Department of Transportation (DOT) Report, Report No. EPA-453/R-94-068, October 1994.
- Regulatory Support Document, Control of Air Pollution from Aircraft and Aircraft Engines, for the Direct Final Rule for Aircraft Emission Standards, EPA, February 1997.
- PSD Analysis for Construction and Operation of Large Engine Environmental Test Facility at Arnold Air Force Base, Arnold Engineering Development Center, Tennessee, August 1995.
- NO_x Removal in Jet Engine Test Cell Exhaust, Los Alamos National Laboratory, LA-UR-99-3072.
- 2006 Producer Price Index industry data for air purification equipment from the U.S. Department of Labor's Bureau of Labor Statistics at www.bls.gov.

This EA did not consider inherently lower emitting processes further because Tinker and Edwards AFBs only test engines in the DoD inventory and engine controls can neither alter the jet engine nor the combustion characteristics of the engine.

The joint report submitted to the United States Congress in October 1994 by the EPA and the DOT entitled "Nitrogen Oxide Emissions and Their Control From Uninstalled Aircraft Engines in Enclosed Test Cell," Report No. EPA-453/R-94-068, October 1994 (see Attachment 1 to the Tinker AFB - a BACT analysis) concluded that there are no existing technologies for control of NO_x applied (full scale) to aircraft engine test cells in the United States. The differences in engines, engine tests, engine test cell sizes and engine types complicate the application of NO_x control system to engine test cells. Section 233(a) of the CAAA-90 mandated the preparation and submittal of this study.

Potential NO_x control technologies for JETCs were also obtained from the Los Alamos National Laboratory presentation, LA-UR-99-3072, titled "NO_x Removal in Jet Engine Test Cell Exhaust" (see Attachment 2 to the Tinker AFB - a BACT analysis). These technologies are considered post-combustion control methods. Post-combustion control methods address NO_x emissions after formation. Combustion control methods that prevent or reduce NO_x formation during the combustion process were not available in the literature search.

Post-combustion control technologies include:

- Selective Catalytic Reduction with Ammonia Injection;
- Selective Non-Catalytic Reduction;
- Reburn NO_x Control Technology;
- NO_x Sorbent Technology;
- Water or Steam Injection;
- Non-thermal Plasma Systems; and
- Direct Atmospheric Exhaust (No Control).

Because these types of post-combustion controls affect the operational characteristics of the engine, BACT was considered to be no control for NO_x, CO, PM and VOCs and the BACT emission limits are those that are supported through currently available emission factors.

Boiler:

The proposed JETC action includes the installation of a small boiler. EKAPCD Rule 210.1 requires installation of BACT. Table 4-2 identifies the CARB BACT website Boiler BACT:

Table 4-2. Boiler BACT

Category	
Source Category:	Boiler: < 5 MMBtu/hr
SIC Code	4581
NAICS Code	48811
Emission Unit Information	
Manufacturer:	Cleaver-Brooks
Type:	
Model:	FLX700-300-160HW
Equipment Description:	Forced draft boiler
Capacity / Dimensions	3.00 MMBtu/hr
Fuel Type	Natural Gas
Multiple Fuel Types	
Operating Schedule (hours/day)/(days/week)/(weeks/year)e	Continuous (24/7/52)
Function of Equipment	
BACT Information	
NOx Limit	12
NOx Limit Units	ppmvd @ 3% O2
NOx Average Time	40 minutes
NOx Control Method	Pollution Prevention
NOx Control Method Desc	Forced draft, full modulation, flue gas recirculation
CO Limit	100
CO Limit Units	ppmvd @ 3% O2
CO Average Time	40 minutes
CO Control Method	Pollution Prevention
CO Control Method Desc	Forced draft, full modulation, flue gas recirculation

Source: http://www.arb.ca.gov/bact/bactnew/determination.php?var=990

4.1.1.3 Emission Offsets and the New Source Review Balance

The modified stationary source of PM_{10} or SO_x is required to provide offsets for the NSR balance when the NSR balance equals or exceeds the EKAPCD trigger levels identified in Table 4-3.[25] A new or modified stationary source of NO_x and VOCs must provide offsets for the source's PTE when the source's PTE equals or exceeds the following EKAPCD-required offset trigger levels:

Table 4-3. EKAPCD Offset Thresholds

Pollutant	Threshold (tons/year)
PM_{10}	15
SO_x (as SO_2)	27
VOC	25
NO_x (as NO_2)	25

After a stationary source NSR balance and/or stationary source PTE equals or exceeds these trigger levels and offsets have been provided fully offsetting the NSR balance or the stationary source PTE, any additional future increase must be offset.

Offset Ratios: A new or modified stationary source subject to offsets must provide offsets by providing actual emission reductions in accordance with the EKAPCD-established ratios detailed in Table 4-4.:

Table 4-4. EKAPCD Offset Threshold Ratios

Location of Emission Offset	Emission Offset Ratio
From mobile sources within EKAPCD	1.0 to 1.0
Within Mojave Desert Air Basin	1.2 to 1.0
From another air basin	That necessary to provide "Reasonable Further Progress," but not less than 1.2 to 1.0

Note: If interpollutant offsets are utilized, appropriate additional ratios apply.

The proposed new JETC facility is part of the 412th Equipment Maintenance Squadron Stationary Source Group 0127. The proposed JETC emissions contribute to this NSR Balance. Table 4-5 provides the emission totals contributing to the NSR Balance for this Stationary Source Group, including the emissions anticipated for the proposed JETC facility at the end of the table. Emission offsets are not required for PM_{10}, SO_x, NO_x and VOCs in federal and/or ARB designated PM_{10}, SO_x, NO_x, or O_3 nonattainment areas. Note that EKAPCD Rule 210.1 defines the baseline date as 28 December 1976. Therefore, all permitted sources operating prior to 1976 do not contribute to the NSR baseline. The existing JETC equipment permitted at Building 3804 all initiated operation in the 1950's and pre-date the 28 December 1976 baseline.

As detailed in Table 4-5, offsets are not required for criteria pollutants as a result of the proposed project because the total emissions remain below the offset-required threshold.

[25] Reference: EKAPCD Rule 210.1.

FINAL

Table 4-5. NSR Balance

EDWARDS AIR FORCE BASE (412 Maintenance Squadron)
EMISSIONS BALANCE
Stationary Source NO. 0127
Updated: 5/21/2012

Permit#	Issued	Equipment Description	PM-10 lb/day	PM-10 tons/yr	SOx lb/day	SOx tons/yr	NOx lb/day	NOx tons/yr	VOC lb/day	VOC tons/yr	CO lb/day	CO tons/yr
Pending	Pending	Proposed JETC with Boiler	3.61	0.47	3.90	0.51	135.67	17.64	15.75	2.05	32.19	4.19
		NSR Balance	281.18	37.83	1,284.51	166.95					19,145.09	2,542.49
		Stationary Source Potential to Emit (SSPE)[1]					25,497.05	3,299.77	17,893.87	2,314.74		
		NSR Balance Post 1976	63.33	9.51	6.04	0.75					106.93	67.53
		SSPE Post 1976[2]					264.43	19.53	208.02	15.58		
9		Offset Thresholds[3]		15		27		25		25		
		Offsets Required		No		No		No		No		

(1) Includes sources operating prior to December 1976.
(2) Includes only those sources operating after December 1976.
(3) Offset thresholds from EKAPCD Rule 210.1.

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4.1.1.4 Greenhouse Gas Emissions

The proposed action generates GHG emissions. GHG emissions from the proposed project are detailed in Table 4-1. These emissions fall well below the EPA PSD threshold of 75,000 $MTCO_2e$ for GHG gases and a PSD permit application or BACT analysis is not triggered. Additionally, based on the disaggregation guidance provided by the EPA, Edwards AFB does not exceed the EPA reporting threshold of 25,000 $MTCO_2e$ at this time. However, as other minor future increases in GHG emissions associated with unrelated Edwards AFB air quality permitting actions occur, these incremental increases may trigger the reporting requirement as these emissions continue to increase.

Edwards AFB remains subject to the GHG emissions reporting detailed in the amended ARB AB32 MRR where actual emissions exceed the new 10,000 MT CO_2e threshold.

No significant adverse GHG impacts are anticipated as a result of this proposed action.

4.1.1.5 Hazardous Air Pollutants

The proposed action generates HAPs. HAPs have the potential to be carcinogenic, mutagenic, toxic, poisonous and may cause nausea and a variety of immunological, neurological, reproductive, developmental and respiratory effects. Exposure to HAPs could result in immediate or future health problems and can range from short-term minor illness to sudden death depending upon the nature of the pollutant and the circumstance of the exposure. For the entire Edwards AFB, the total actual HAP emissions were 12.16 and 8.89 tons in 2009 and 2010, respectively. HAP emission trends continue downward as new NESHAPs are promulgated (e.g., Boiler RICE NESHAPs) and as the Base continues to apply less HAP emitting process (e.g., aerospace coatings). HAP emissions associated with the proposed project are detailed in Table 4-6.

HAP emissions would be generated from the operation and/or maintenance of the new JETC. Compliance with all CAA Title III, NEHAP requirements, or any more stringent state or local requirements as they apply to stationary sources that emit HAPs would be required. These Title III NEHAP requirements are regulated through the EKAPCD-issued Title V permit and include particulate filters for aerospace coating spray booths and work practice standards for internal combustion engines and natural gas-fired boilers. There are no NESHAP standards applicable to operations occurring for the proposed action. Only 0.11 tons of HAPs per year will be generated with Alternative A, which is only approximately a 1.2 percent increase from 2010. Therefore, no significant adverse effects associated with HAP emissions are expected.

Emissions regulated under AB 2588 (air toxics) would be generated as a result of the proposed JETC. Emissions from this source would be required to be included in the Base-wide biennial Toxic Emissions Inventory Report provided to the EKAPCD. This would ensure compliance with the AB 2588 implementing regulations.

Table 4-6. JETC and Boiler Hazardous Air Pollutants (Tons per Year)

		JETC	Boiler	Total
Hazardous Air Pollutants (HAPs)	Acetaldehyde	3.72E-03		3.72E-03
	Acrolein	1.14E-03		1.14E-03
	Benzene	1.17E-02	1.24E-05	1.17E-02
	Ethyl benzene	1.51E-03		1.51E-03
	Formaldehyde	1.59E-02	4.43E-04	1.64E-02
	Naphthalene	2.38E-03	3.60E-06	2.38E-03
	Styrene	2.23E-03		2.23E-03
	Toluene	5.19E-03	4.02E-02	4.53E-02
	Xylenes	4.39E-03		4.39E-03
				0.00E+00
	2-Methyl naphthalene		1.42E-07	1.42E-07
	3-Methyl chloranthrene		1.06E-08	1.06E-08
	7,12-Dimethylbenz(a) anthracene		9.45E-08	9.45E-08
	Acenaphthene		1.06E-08	1.06E-08
	Anthracene		1.42E-08	1.42E-08
	Benz(a) anthracene		1.06E-08	1.06E-08
	Benzo(a)pyrene		7.09E-09	7.09E-09
	Benzo(b)fluoranthene		1.06E-08	1.06E-08
	Benzo(g,h,i)perylene		7.09E-09	7.09E-09
	Benzo(k)fluoranthene		1.06E-08	1.06E-08
	Chrysene		1.06E-08	1.06E-08
	Dibenzo(a,h) anthracene		7.09E-09	7.09E-09
	Dichlorobenzene		7.09E-06	7.09E-06
	Fluoranthene		1.77E-08	1.77E-08
	Fluorene		1.65E-08	1.65E-08
	Hexane		1.06E-02	1.06E-02
	Indeno(1,2,3-cd) pyrene		1.06E-02	1.06E-02
	Phenanathrene		1.00E-07	1.00E-07
	Pyrene		2.95E-08	2.95E-08

Total HAPs = 1.10E-01

4.1.1.6 Conformity

For the proposed action, a General Conformity Applicability Analysis was accomplished in accordance with 40 CFR Subpart B 93.153. Section (c)(1) specifies that the requirements of this subpart shall not apply to Federal actions where the total of direct and indirect emissions are below the emissions levels (de minimis thresholds), which were previously specified in in Table 3-4 for NOx and VOCs as precursors to ozone generation. Total direct and indirect air emissions for the proposed action are:

	Ozone Precursor Emissions (tons/yr)	
	NOx	**VOCs**
Alternative A		
Construction	1.60	0.05
JETC*	N/A	N/A
Boilers	0.08	0.03
Total Increase	1.68	0.08
Threshold	100	100

* Permitted source, exempt from General Conformity

The table clearly shows the applicable ozone precursor emissions are well below the conformity threshold levels (100 tons per year for both NOx and VOCs) specified for the EKAPCD Ozone non-attainment area. Therefore, the General Conformity Applicability Analysis demonstrated that the net NOx and VOCS emissions associated with the proposed action fall within the 100 tons/yr de minimis threshold level, indicates that a General Conformity Determination is not applicable.

The proposed action will comply with all applicable federal, state and local laws and regulations and a General Conformity Determination for the proposed action is not applicable. Compliance with the minimization measures listed in Section 4.1.1.7 will further reduce anticipated effects due to criteria pollutant or ozone precursor pollutant air emissions. Therefore, no significant adverse effects are expected.

4.1.1.7 Alternative A Minimization Measures

Operations

The following minimization measures are required or recommended for operation of a new JETC facility:

- The project shall comply with all applicable EKAPCD Rules and Regulations including:
    - Complying with all applicable requirements specified in EKAPCD Rule 210.1, New and Modified Stationary Source Review;
    - Obtaining an ATC permit and a PTO permit from the EKAPCD for the proposed project;

- Applying for a modified Title V from the EKAPCD for the proposed project; and
- Providing notification to the EKAPCD for the removal of asbestos-containing material from any proposed building demolitions/renovations will be required.

- The proposed project shall comply with all Air Toxic "Hot Spots" Information and Assessment Act requirements, including revision of existing emissions inventory plans and/or health risk assessments.
- The proposed project shall comply with all applicable requirements as identified in AFI 32-7040, Air Quality Compliance.
- The proposed project shall comply with Air Force Materials Command Standard Operating Procedure for Air Quality Stationary Source Management.
- Air quality operational permits are required for all portable construction equipment containing more than 50 brake horsepower, if such equipment remains on base for more than 12 months.
- The proposed project shall comply with all applicable CAA Title III, HAP requirements or any more stringent state or local requirements.
- Since Edwards AFB is a major source and must meet the requirements of the aerospace NESHAP, only compliant solvents and coatings may be used on aircraft and their parts. The Material Safety Data Sheets (MSDSs) and the specific list of items that each material will be used on must be submitted to Environmental Management.

Construction:

The following dust control measures are required to be implemented during land preparation, excavation and/or demolition:

- All soil excavated or graded should be sufficiently watered to prevent excessive dust. Watering should occur as needed with complete coverage of disturbed soil areas. Watering should be a minimum of twice daily on unpaved/untreated roads and on disturbed soil areas with active operations.
- All clearing, grading, earth moving and excavation activities should cease during periods of winds greater than 20 miles per hour (mph) (averaged over one hour), if disturbed material is easily windblown, or when dust plumes of 20% or greater opacity impact public roads, occupied structures, or neighboring property.
- All fine material transported off site should be either sufficiently watered or securely covered to prevent excessive dust.
- All haul trucks should be required to exit the site via an access point where a gravel pad or grizzly has been installed.
- Stockpiles of soil or other fine loose material shall be stabilized by watering or other appropriate method to prevent wind-blown fugitive dust.

- Once initial leveling has ceased, all inactive soil areas within the construction site should either be seeded and watered until plant growth is evident, treated with a dust palliative, or watered twice daily until soil has sufficiently crusted to prevent fugitive dust emission.
- On-site vehicle speed should be limited to 15 mph.
- All areas with vehicle traffic should be paved, treated with dust palliatives or watered a minimum of twice daily.
- Streets adjacent to the project site should be kept clean and accumulated silt removed.

The following measures should be implemented to control construction vehicle tailpipe emissions:

- Properly maintain and tune all internal combustion engine powered equipment;
- Require employees and subcontractors to comply with the ARB idling restrictions for compression ignition engines; and
- Use California ultra-low sulfur (ARB) diesel fuel.

4.1.2 Alternative B – Upgrading/Repairing Existing Facility

Under Alternative B, the existing JETC facility (Building 3804) would undergo extensive repairs and modifications to upgrade the facility in order to allow for larger engine testing. Repairs include upgrades throughout all four cells for poor lighting and double-walled floor drains that require special contractor testing every 3 years to determine integrity. Air operated controls, valves and lines require frequent repair. Steam heaters have been deactivated, taking away all sources of heat. Fuel valves, controls and plumbing require frequent repair as well. Concrete floors are cracking throughout all four test cells. Entry doors sag and drag on buckled floors. One-half of the deluge water system for the rear portion of the building has been deactivated (4 inch line under foundation ruptured). The facility still uses a 1,000 gallon underground waste holding tank.

All four test cell entry doors require frequent repair and take 2-3 people to open or close. The concrete foundations are buckling and starting to fail due to vibration and power of engines. The concrete has been patched to look better, but it doesn't make the foundation stronger or add any structural integrity. The HVAC system that serves the cells is obsolete and inadequate; and is non-operable in the ready bay. Air conditioner units in control rooms are antiquated and man-hour intensive to maintain. Electrical power from the substation is adequate, but overall power into the building is not. The electrical systems are obsolete which makes it difficult to utilize computer operated data collection systems.

The new JETC operational emissions associated Alternative B would be the same as those detailed in the proposed action (Reference Table 4-1). Construction emissions associated with the upgrades would be less than the proposed action because fugitive dust emissions (i.e., $PM_{2.5}$ and PM_{10}) would not be produced as soil would not be disturbed during proposed construction activities. Additionally, use of large construction equipment would not be anticipated as part of this Alternative B action.

4.1.2.1 Alternative B Minimization Measures

Similar minimization measures as those detailed in Section 4.1.1.7 would apply to Alternative B with the following exception: If Alternative B is decided to be the preferred action, a Section 106 consultation will be required.

4.1.3 Alternative C – No Action Alternative

Per EPA guidance (General Conformity Guidance for Airports Questions and Answers; September 25, 2002), the "no action" alternative is the "without project" alternative under (i.e., conditions in a respective year if the proposed project or activity would not take place). As such this alternative provides the baseline to compare all other alternatives.

The No Action Alternative describes the conditions if the proposed JETC installation were not approved and there was no change from current management direction or level of management intensity.

Under Alternative C, the existing 33,000 square foot JETC facility would remain operational and continue to be utilized for smaller jet engine testing. Testing for larger jet engines would have to occur at an off-base testing facility with the tested engines then transported to Edwards AFB. However, an estimated 120 additional truck trips transporting these larger jet engines on and off-base would be anticipated.

The existing JETC 2010 baseline emissions from this no action scenario are detailed in Tables 4-7 and 4-8.

4.1.3.1 Alternative C Minimization Measures

Not applicable to existing operations, as the facility is currently permitted through the EKAPCD. However, large diesel truck emissions would be mitigated through regulatory requirements implemented by the ARB with respect to the On-Road Heavy-Duty Diesel Vehicles (In-Use) Regulation.[26]

[26] http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm. The regulation applies to nearly all privately and federally owned diesel fueled trucks with a gross vehicle weight rating greater than 14,000 pounds.

Table 4-7. Baseline Direct and Indirect Emission Estimates (Tons per Year)

	Criteria Pollutant (In Tons)						Greenhouse Gas Pollutants (in metric tons)		
	NOx	**CO**	**VOCs**	**PM_{10}**	**$PM_{2.5}$**	**SOx**	**CO_2**	**CH_4 (in CO_2e)**	**N_20 (in CO_2e)**
JETC[(1)]	24.87	21.97	8.52	4.94	4.84	1.67	9,176.85	6.24	80.26
Boiler	0.08	0.45	0.03	0.04	0.04	0.08	639.11	2.78	2.24
Engine Transport	0.002	0.000	2.696	0.001	0.000	2.300	0.001		
Totals:	**24.96**	**22.42**	**11.25**	**4.98**	**4.88**	**4.05**	**9,815.96**	**9.02**	**82.50**

(1) Data provided by USAF Air Program Information Management System (APIMS) applied at Edwards AFB

Table 4-8. 2010 Baseline JETC and Boiler Hazardous Air Pollutants (Tons per Year)

		JETC	Boiler	Total
Hazardous Air Pollutants	Acetaldehyde	1.34E-02		1.34E-02
	Acrolein	1.61E-02		1.61E-02
	Benzene	3.72E-02	1.24E-05	3.72E-02
	Ethyl benzene	1.03E-02		1.03E-02
	Formaldehyde	7.52E-02	4.43E-04	7.57E-02
	Naphthalene	1.59E-02	3.60E-06	1.59E-02
	Styrene			0.00E+00
	Toluene	2.44E-02	4.02E-02	6.46E-02
	Xylenes	4.37E-02		4.37E-02
	2-Methyl naphthalene		1.42E-07	1.42E-07
	3-Methyl chloranthrene		1.06E-08	1.06E-08
	7,12-Dimethylbenz(a) anthracene		9.45E-08	9.45E-08
	Acenaphthene		1.06E-08	1.06E-08
	Anthracene		1.42E-08	1.42E-08
	Benz(a) anthracene		1.06E-08	1.06E-08
	Benzo(a)pyrene		7.09E-09	7.09E-09
	Benzo(b)fluoranthene		1.06E-08	1.06E-08
	Benzo(g,h,i)perylene		7.09E-09	7.09E-09
	Benzo(k)fluoranthene		1.06E-08	1.06E-08
	Chrysene		1.06E-08	1.06E-08
	Dibenzo(a,h) anthracene		7.09E-09	7.09E-09
	Dichlorobenzene		7.09E-06	7.09E-06
	Fluoranthene		1.77E-08	1.77E-08
	Fluorene		1.65E-08	1.65E-08
	Hexane		1.06E-02	1.06E-02
	Indeno(1,2,3-cd) pyrene		1.06E-02	1.06E-02
	Phenanathrene		1.00E-07	1.00E-07
	Pyrene		2.95E-08	2.95E-08

4.2 Noise

Although the noise environment at Edwards AFB is dominated by aircraft noise, aircraft overflights are intermittent in nature. Construction and operation of the proposed JETC facility would, therefore, have the potential to cause impacts at nearby noise-sensitive land uses in the vicinity of the proposed action site.

4.2.1 Construction

Since construction activities would occur proximate to noise-sensitive areas, construction noise is evaluated in this EA. Construction noise was evaluated using Roadway Construction Noise Model (RCNM) version 1.1, the Federal Highway Administration's (FHWA) standard model for the prediction of construction noise (DOT 2006). RCNM has the capability to model types of construction equipment that would be expected to be the dominant construction-related noise sources associated with the proposed action. All construction noise analyses were assumed to make use of a standard set of construction equipment during each phase of construction (i.e., demolition, site preparation, grading, building construction and paving). Construction noise levels are quantified at predetermined distances from the site using the maximum noise level (Lmax) metric, as summarized in Table 4-9.

Table 4-9. Construction Noise

Receptor Distance (feet)	Max Sound Level L_{max} (dBA)
2,000	53
4,000	47
8,000	41
10,000	39

The construction equipment with the maximum sound level (Lmax) is the grader. The nearest receptors, located at distances 4,000 feet or greater, would experience noise levels less than 50 dBA.

4.2.2 Operations

Jet engine tests to be conducted at the new JETC facility could potentially expose the nearest noise-sensitive uses to increased noise levels above existing levels. Based on the land use noise compatibility criteria, noise-sensitive land uses, including residential, schools and hospitals, are deemed acceptable for noise exposures up to 65 dB CNEL. In addition, noise level increases of 1.5 dB or greater within the 65 dB DNL or CNEL noise contour or a 3-dB increase or greater within the 60 dB DNL or CNEL contour are considered significant changes when comparing the proposed action to the existing environment.

Jet engine test noise exposure level, in terms of CNEL, depends on the type of engines tested, engine power settings during each test, frequency and durations of each test and the time of day the tests occur. The DoD test cell design limit for far-field noise is a noise level of no greater

than 85 dBA at a distance of 250 feet from the facility (in any direction). For the purpose of evaluating potential noise effects in this EA, it is assumed that the proposed new JETC facility would be designed with newer technology to comply with the DoD limit of 85 dBA at 250 feet from the facility.

For prediction of noise levels from the proposed JETC facility at the nearby noise-sensitive receptors, noise attenuation over distance must be estimated. Outdoor sound levels decrease as the distance from the source to the receptor increases. This decrease in sound level is a result of wave divergence, atmospheric absorption and ground attenuation. For a conservative analysis in this EA, only reductions due to wave divergence (distance attenuation) are factored in to estimate noise levels at the noise-sensitive receptors. Spherical spreading of the sound wave from a "point source" reduces the noise level at a rate of 6 dB per doubling of the distance.

4.2.3 Alternative A Impacts

Alternative A proposes to install a new JETC facility adjacent to existing facility Building 3810 within the Main Base of Edwards AFB, between Gregorius Avenue and Wolfe Avenue, south of Forbes Avenue. The existing facility in Building 3804 will remain in operation and continue to test smaller engines. The project site is near the Flightline within the Main Base. Nearest noise-sensitive receptors to the proposed Alternative A site include the following:

- Library on Rosamond Boulevard, approximately 3,500 feet south/southwest of the site.
- Education Center campus located along Methusa Road, east of North Muroc Drive, approximately 4,000 feet southwest of the site.
- Chapel 1, located south of Popson Avenue and west of Rosamond Boulevard, at a distance of approximately 4,500 feet southwest of the project site.
- On-base dormitories, located approximately 4,800 feet southwest of the project site at Popson and Spiro Avenues.
- On-base military family housing (MFH) units within Joshua Acres, located along the east side of Rushworth Drive, south of Community Drive. Homes in this area nearest to the project site are at a distance of approximately 11,700 feet (over 2.2 miles) from the site.
- Chapel 2, nestled within the MFH area, nearly 2.5 miles west of the site.

The closest off-base noise-sensitive receptors are residences in the community of Rosamond, California, located over 15 miles west/southwest of the project site.

4.2.4 Construction

Noise from the construction of the new JETC facility at the Alternative A site may affect nearby noise-sensitive receptors. Construction noise is expected be limited to daytime hours (8:00 a.m. to 4:00 p.m.). The nearest noise-sensitive receptors to the southwest are the library, education center and dormitories, located between 3,500 and 5,000 feet from the site. At such distances, noise-sensitive receptors would be exposed to outdoor construction maximum noise levels of 46 to 48 dBA. Such levels are likely to be the same or below existing ambient noise levels in this

area. Therefore, no adverse effects from construction noise are expected for the Alternative A action.

4.2.5 Operations

According to the Edwards AFB AICUZ noise contours, existing noise exposure levels at all the identified noise-sensitive locations are below 65 dB CNEL. In fact, the library and Chapel 1 are the only receptors that are shown to be located within the 60 dB CNEL contour. Noise levels at the remaining noise-sensitive locations, including the dormitories and MFH units, are below 60 dB CNEL. Also, please note that the existing noise contours include noise contributions from the existing JETC facility.

Table 4-10 summarizes the projected CNEL from the proposed new JETC at the identified noise-sensitive receptors in the vicinity of the project and the approximate existing noise levels at each location and compares the predicted cumulative CNEL to the existing noise exposure.

Table 4-10. Comparison of Existing and Post-Project CNEL Noise Exposure – Alternative A

	Distance to Project Site, Feet	JETC CNEL, dBA*	Estimated Existing CNEL, dBA**	Cumulative CNEL (incl. Alternative A), dBA	Estimated Change in CNEL, dBA
Library	3,500	57.3	62	63.3	1.3
Education Center Campus	3,930	56.3	60	61.5	1.5
Dormitories	4,750	54.7	59	60.4	1.4
Chapel 1	4,500	55.1	63	63.7	0.7
Joshua Acres (MFH)	11,700	46.8	56	56.5	0.5
Chapel 2	13,500	45.6	55	55.5	0.5

* Estimated JETC noise exposure level is based on a reference noise level of 85 dBA at 250 feet from the facility and continuous testing between 8 a.m. and 4 p.m.

** CNEL estimated from existing Edwards AFB AICUZ noise contours.

From the data in Table 4-10, it is apparent that anticipated increases in CNEL exposure at all nearby noise-sensitive locations would be well below the 3-dB impact threshold even when it is assumed that the proposed JETC facility would operate continuously between the hours of 8 a.m. to 4 p.m. Also, all noise-sensitive receptor locations would still remain outside the 65 dB CNEL contour. Therefore, no significant adverse operational noise effects are anticipated under Alternative A.

4.2.6 Alternative A Minimization Measures

The following measures, while not required, are recommended for noise minimization under Alternative A:

- Internal combustion engines in construction equipment must be maintained with an appropriate muffler in order to reduce noise;

- Portable noise screens may be placed along the west and south sides of the project area during construction in order to minimize construction noise levels at noise-sensitive areas to the south and west of the project site;
- Proposed project construction and operations activities should be limited to the hours between 08:00 a.m. and 4:00 p.m. to reduce potential noise effects on noise sensitive receptors; and
- The proponent/contractor should notify adjacent noise sensitive receptors when high-noise levels are anticipated to allow affected facilities the option of planning activities around the time periods to minimize exposure.

4.2.7 Alternative B Impacts

Under Alternative B, the existing JETC facility (Building 3804 within the Main Base) would undergo extensive repairs and modifications to upgrade the facility. The existing facility is also between Gregorius Avenue and Wolfe Avenue, south of Forbes Avenue. The project site is slightly farther north of the Alternative A site and, therefore, is at larger distances from the nearest noise-sensitive receptors, as follows:

- Library on Rosamond Boulevard is approximately 4,900 feet south/southwest of the site;
- Education Center campus, located along Methusa Road and east of North Muroc Drive, is approximately 5,200 feet southwest of the site;
- Chapel 1, located south of Popson Avenue and west of Rosamond Boulevard, is at a distance of approximately 5,900 feet southwest of the project site;
- On-base dormitories are located approximately 5,800 feet southwest of the project site;
- On-base MFH units within Joshua Acres are located are approximately 12,100 feet (2.3 miles) from the site; and
- Chapel 2, nestled within the MFH area, is nearly 2.5 miles west of the site.

The closest off-base noise-sensitive receptors are residences in the community of Rosamond, located over 15 miles west/southwest of the project site.

4.2.8 Construction

Noise from construction upgrades to the existing JETC facility (Building 3804) may affect nearby noise-sensitive receptors. The nearest noise-sensitive receptors to the southwest are the library, education center and dormitories, located between 4,900 and 5,800 feet from the site. At such distances, noise-sensitive receptors would be exposed to outdoor construction noise levels of 44 to 46 dBA. Such levels are generally within or below existing ambient noise levels in this area. Therefore, no adverse effects from construction noise are expected for the Alternative B action.

4.2.9 Operations

Table 4-11 summarizes the projected CNEL from Alternative B of the proposed action at the identified noise-sensitive receptors in the vicinity of the project and the approximate existing noise levels at each location and compares the predicted cumulative CNEL to the existing noise exposure.

Table 4-11. Comparison of Existing and Post-Project CNEL Noise Exposure – Alternative B

	Approximate Distance to Project Site, Feet	JETC CNEL, dBA*	Estimated Existing CNEL, dBA**	Cumulative CNEL (incl. Alternative A), dBA	Estimated Change in CNEL, dBA
Library	4,910	54.4	62	62.7	0.7
Education Center Campus	5,160	53.9	60	61.0	1.0
Dormitories	5,790	52.9	59	60.0	1.0
Chapel 1	5,860	52.8	63	63.4	0.4
Joshua Acres (MFH)	12,140	46.5	56	56.5	0.5
Chapel 2	14,035	45.2	55	55.4	0.4

* Estimated JETC noise exposure level is based on a reference noise level of 85 dBA at 250 feet from the facility and continuous testing between 8 a.m. and 4 p.m.

** CNEL estimated from existing Edwards AFB AICUZ noise contours.

From the data in Table 4-11, it is apparent that anticipated increases in CNEL exposure at all nearby noise-sensitive locations would be well below the 3-dB impact threshold even when it is assumed that the upgraded JETC facility would operate continuously between the hours of 8 a.m. to 4 p.m. Also, all noise-sensitive receptor locations would still remain outside the 65 dB CNEL contour. Therefore, no significant adverse operational noise effects are anticipated under Alternative B.

4.2.10 Alternative B Minimization Measures

The same noise minimization measures listed for Alternative A are also recommended for Alternative B.

4.2.10.1 Alternative C Impacts

Under Alternative C, the No Action Alternative, no new construction would take place. Thus, there would be no change in noise exposure at the noise-sensitive locations relative to existing conditions (as described in Chapter 3, Section 3.2). There will be no incompatible uses within the 65 dB CNEL contours; therefore, no adverse effects would occur with the implementation of Alternative C.

4.2.10.2 Alternative C Minimization Measures

The No Action Alternative would not need any minimization actions.

4.3 Water Resources

4.3.1 Alternative A Impacts

4.3.1.1 Water Quantity and Source

Under Alternative A, a new JETC facility and storage barn would be developed adjacent to Buildings 3810 and 3809, respectively; while testing at existing Building 3804 would continue. The new facility would require similar volumes of water for cooling during the jet engine testing process, as currently used at Building 3804. Water supply sources at Edwards AFB are adequate to support the existing and any potential increase in water needed for cooling, as well as the minimal amounts needed for domestic purposes at a new JETC facility (personal communication with Mr. Rene Ramos on 28 December 2011). Existing potable water supply lines in this area of the Main Base are available to serve a new facility; however, it is not known at this time if a new water storage tank would be needed for cooling water. No adverse effects to water supplies and on-site water distribution system are anticipated.

4.3.1.2 Wastewater Treatment

Jet engine test procedures in a new facility would generate domestic and industrial wastewater, similar to existing conditions. Under this alternative, domestic wastewater would be conveyed to the Main Base WWTP, which has adequate capacity to treat the existing volume of domestic wastewater and any potential increase that may be generated from a new facility. Hazardous wastewater generated from the cooling process would be collected, contained in storage tanks and disposed of offsite with a licensed waste disposal company, similar to existing conditions. No dedicated oil/water separator or other pretreatment would be required for domestic or industrial wastewater conveyed to the Main Base WWTP. No adverse effects to the Main Base wastewater treatment system are expected.

4.3.1.3 Storm Water

The proposed alternative involves the construction and operation of a new 35,000 square foot JETC facility adjacent to Building 3810 on a previously-disturbed parcel of land that contains some pervious surface area. The alternative also includes construction of a 15,000 square foot storage barn on the north side of Building 3809 on a previously-disturbed parcel containing some pervious surface area. The proposed locations of these new facilities are outside the floodplain boundaries of Rogers Dry Lake and, therefore, no floodplain impacts or flood hazards are anticipated.

Development of the two new buildings requires compliance with Section 438 of EISA 2007 because the total project footprint disturbs more than 5,000 square feet of ground area (EPA Section 438 Technical Guidance, Part I, Section C.3). Therefore, site planning, design, construction and maintenance strategies must be incorporated into project development to maintain or restore to the maximum extent feasible, the pre-development hydrology of the site with regard to temperature, rate, volume and duration of flow. To implement the EISA Section 438 requirement, the EPA Technical Guidance (2009) recommends use of all known, available and reasonable methods to the maximum extent technically feasible to infiltrate, evapotranspire and/or harvest and use rainwater from a pre-determined design volume of storm water or through

a site-specific hydrological analysis of pre-development flows. Example methods include bioretention; bioswales; permeable pavements and pavers; rainwater harvesting for reuse (cisterns); and other types of green infrastructure and low impact development features. Incorporation of one or more of these types of features would minimize potential hydrologic and water quality impacts to downstream water bodies (e.g., storm channels, Rogers Dry Lake) and groundwater subbasins.

During construction, Edwards AFB will require the building contractor to implement construction activity BMPs to control exposed soil and building materials and wastes (e.g., concrete, concrete washwater, paint, etc.) from entering storm water discharges. Long-term operation of the facility would involve use of potential pollutants such as grease, oil, paints, carbon particulate from exhaust, waste fluids, soaps and fuel residuals from entering storm water discharges. However, many of the potential pollutants would be contained indoors or within outdoor containment structures. Nevertheless, JETC operations would include implementation of industrial activity BMPs as outlined in the Edwards AFB SWPPP (June 2002) to minimize any potential impacts to storm water quality from long term operation of the facility.

Due to the relatively small size of the project, it is unlikely that any low impact development features or BMPs that capture and retain storm runoff and sediment would adversely affect the lake resurfacing process at Rogers Dry Lake required to maintain the lakebed landing sites. If a retention pond is considered for retaining storm flows, it should not be located near the flightline to ensure the pond does not attract waterfowl, potentially creating a hazard during test flights.

4.3.1.4 Alternative A Minimization Measures

The following minimization measures are currently required and would continue to be required under Alternative A:

- Development designs must include compliance with Section 438 of EISA 2007 to maintain or restore to the maximum extent feasible, the pre-development hydrology of the site with regard to temperature, rate, volume and duration of flow.
- An AFFTC Form 5528, *Industrial Wastewater Discharge Permit*, must be obtained in the event that post-construction facility operations generate industrial wastewater requiring on-site disposal at the Main Base WWTP, rather than off-site disposal. The proponent/contractor shall be responsible for coordinating the permit.
- The proposed project must comply with EAFBI 32-6, *Edwards AFB Wastewater Instruction*.
- All conditions and requirements of Board Order No. 6-01-41 shall be met prior to disposal of nonhazardous wastewater to the Main Base WWTP.
- The industrial activity BMPs outlined in the Edwards AFB SWPPP (June 2002) shall be implemented for long-term operation of the facility.
- Construction activity BMPs to control erosion, sedimentation and other building materials and wastes from entering storm water discharges shall be required in contractor

drawings and specifications and implemented by the contractor during construction, with oversight of BMP implementation by Edwards AFB personnel.

4.3.2 Alternative B Impacts

Alternative B involves extensive repairs and modifications to Building 3804 to provide upgraded and adequate water, heating, ventilation, air conditioning and electrical systems to support long-term small engine testing at Edwards AFB. Long-term water consumption and wastewater generation would be expected to be similar to the existing JETC operations. No impacts to Edwards AFB existing water supplies and wastewater treatment operations would be expected. No increases in storm water runoff would be expected since pervious surface areas would not be converted to impervious surface area. No changes to hydrologic conditions to downstream channels, Rogers Dry Lake and the groundwater basin would be expected. BMPs would be implemented to minimize potential pollutants in storm water discharges during renovation and long-term operation of the facility.

Regarding compliance with the storm water requirements of Section 438 of EISA (2007), EPA's Section 438 Technical Guidance (Part I, Section C.3) states: "Existing facilities that have an overall footprint of 5,000 square feet or greater that disturb less than 5,000 square feet of land area as part of any single development or redevelopment project are not subject to Section 438 requirements." Therefore, if modifications/upgrades to Building 3804 do not require landscape alterations such as grading, removal of vegetation, soil compaction, etc., that would change the site hydrology (e.g., runoff volumes, rates, temperature and duration of flow), then compliance with Section 438 would not be required.

4.3.2.1 Alternative B Minimization Measures

The following minimization measures are currently required and would continue to be required under Alternative B:

- An AFFTC Form 5528, *Industrial Wastewater Discharge Permit*, must be obtained in the event that post-construction facility operations generate industrial wastewater requiring on-site disposal at the Main Base WWTP, rather than off-site disposal. The proponent/contractor shall be responsible for coordinating the permit.
- All conditions and requirements of Board Order No. 6-01-41 shall be met prior to disposal of nonhazardous wastewater to the Main Base WWTP.
- The proposed project must comply with EAFBI 32-6, *Edwards AFB Wastewater Instruction*.
- The industrial activity BMPs outlined in the Edwards AFB SWPPP (June 2002) shall be implemented as part of long-term operations of the facility.
- Construction activity BMPs to control erosion, sedimentation and other building materials and wastes from entering storm water discharges shall be required in contractor drawings and specifications and implemented by the contractor during construction, with oversight of BMP implementation by Edwards AFB personnel.

4.3.3 Alternative C Impacts

Alternative C is the no action alternative. The existing 33,000 square foot JETC facility would remain operational for testing of smaller jet engines. However, off-base testing will be required for heavy aircraft engines and thrust vector engines. No changes in water use, wastewater treatment and storm water runoff would be expected. However, building water and wastewater piping would need to be evaluated for repairs and possible upgrade to meet building code requirements.

4.3.3.1 Alternative C Minimization Measures

No minimization measures are required for Alternative C.

4.4 Hazardous Materials and Waste

4.4.1 Alternative A Impacts

4.4.1.1 Hazardous Materials

The types and quantities of hazardous materials used during operation of the new JETC facility and storage barn would not be different from those in use at the existing JETC facility located in Building 3804. This includes small to moderate quantities of 7808 oil, isopropyl alcohol, Citri-Kleen cleaner, petroleum lubricant, grease and sealants (epoxy and silicone). Compliance with all applicable standards and/or regulations addressing hazardous materials management is required and would ensure proper handling, use and storage of these substances on base. Thus, no adverse effects from use or storage of hazardous materials are expected as a result of the proposed action.

4.4.1.2 Hazardous Waste

The types and quantities of hazardous wastes generated during the operation of the new JETC facility would not be different from those already generated by the existing JETC facility in Building 3804. Operation of the new JETC facility would generate approximately 6,000 gallons of hazardous wastes per year and would result in wastewater contaminated with jet fuel, petroleum hydrocarbons and isopropanol. The estimated quantities of hazardous wastes and wastewater are derived from actual qualities generated from the operation of the existing JETC facility. The treatment of wastewater is discussed in Section 4.3.1.2.

Construction of the new JETC facility and storage barn could generate a minimal amount of construction-related hazardous wastes. Compliance with all applicable standards and/or regulations addressing hazardous waste management is required during construction and operation activities. This would ensure proper handling, storage and disposal of hazardous wastes generated on base. Standard operating procedures identified in the Edwards AFB HWMP governing the control of hazardous waste would prevent the creation of new installation restoration program sites. No adverse effects from hazardous wastes generated as a result of the new JETC facility and storage barn are anticipated.

4.4.1.3 Solid Waste

Construction of the new JETC facility and storage barn would generate a small amount of construction waste (e.g., concrete, plastics, metals, etc.). Solid waste resulting from construction will not be disposed of on base. It will in every case be transported to an off-base landfill. Maintenance and operation of the new JETC facility would also generate solid waste. However, the volume of solid waste from the construction and operation of the facility would not adversely affect landfill capacity, or result in the landfill reaching capacity earlier than the planned closure date of 2019. Thus, disposal of this waste at the Main Base Landfill is not anticipated to result in any adverse effects.

Some waste generated from the proposed action could be recycled (e.g., concrete, asphalt, paving and metals, etc.). Reuse or recycling of appropriate materials could reduce the amount of solid waste disposed of at landfills (either on or off base), resulting in an incrementally positive impact to solid waste management. It could also provide alternate sources for required building materials, potentially reducing future impacts on nonrenewable natural resources.

4.4.1.4 Environmental Restoration Program

The proposed site for the new JETC facility and storage barn is located above a TCE plume from OU8 Site 301. Prior to construction, an Active Soil Gas Investigation and an Industrial and Residential Health Screening would be conducted to determine if VOCs are present in sufficient concentration(s) in the soil to cause a potential indoor air Vapor Intrusion (VI) concern. Based on the investigation and screening, if the soil gas level is above acceptable thresholds, then it is assumed that vapors would collect under the new JETC facility and storage barn, with the potential for intrusion through the slab and into indoor airspace. If these thresholds are exceeded, the new JETC facility and storage barn would be designed with a VI mitigation system.. Thus, no significant adverse effects from VI are expected.

4.4.1.5 Alternative A Minimization Measures

The following minimization measures are required or recommended under Alternative A:

- In accordance with 29 CFR 1910.1200 on hazard communication, all hazardous materials would be documented with required MSDSs as part of a complete hazardous materials inventory. A copy of the inventory and all pertinent MSDSs would be submitted to Bioenvironmental Engineering in support of the Base Hazardous Materials Program and Air Force Hazard Communication Program (AFOSH Standard 48-21).
- The MSDS for each hazardous material used at the construction site would be present during proposed project activities.
- All transporters must have an EPA identification number and be licensed to transport hazardous materials/wastes in California, through any state and within the destination state. All transporters must have liability insurance coverage in accordance with applicable regulations.
- At least 48 hours prior to hazardous materials off-loading, the Edwards AFB Director of Safety shall be notified.

- Any deviation from the existing standard operation procedures of the HMMP would need to be reviewed and approved by the hazardous materials Integrated Process Team, in compliance with all AF Directives and local, state and federal regulations and laws.
- A license request (AF Form 3952) review shall be accomplished for the proposed use of hazardous materials issued via the HMP. Environmental Management (95ABW/CEV) must be contacted to begin the hazardous materials licensing process.
- Any hazardous waste generated during the construction and operation of the new JETC facility would be handled in accordance with applicable regulations: 49 CFR 171-177, Waste Transportation and Packaging; 40 CFR 260-299, Storage, Treatment and Disposal of Waste; AFI 32-7042, *Solid and Hazardous Waste Compliance*; and the Edwards AFB HWMP.
- The contractor should segregate recyclable and reusable materials from solid waste for delivery to the appropriate on- and off-base recovery or disposal facilities. The 95th Civil Engineer Division, Environmental Management Branch, should be contacted regarding recyclable debris.

4.4.2 Alternative B Impacts

4.4.2.1 Hazardous Materials and Waste

Alternative B would involve extensive repair and modification of the existing JETC facility (Building 3804). The types and quantities of hazardous materials used during operation of the existing JETC would remain the same and would include small to moderate quantities of 7808 oil, isopropyl alcohol, Citri-Kleen cleaner, petroleum lubricant, grease and sealants (epoxy and silicone). The types and quantities of hazardous wastes generated during the operation of the existing JETC facility would also remain at the current quantity of approximately 6,000 gallons of hazardous wastes per year. The existing JETC facility would also generate wastewater contaminated with jet fuel, petroleum hydrocarbons and isopropanol. The treatment of wastewater is discussed in Section 4.3.1.2.

Compliance with all applicable standards and/or regulations addressing hazardous materials and waste management is required and would ensure proper handling, use and storage of these substances on base. Thus, no adverse effects from use or storage of hazardous materials and waste are expected as a result of the Alternative B.

4.4.2.2 Solid Waste

Repair and modification of the existing JETC facility would generate a small amount of construction waste (e.g., concrete, plastics, metals, etc.). Solid waste resulting from construction will not be disposed of on base. It will in every case be transported to an off-base landfill. Maintenance and operation of the existing JETC facility would also generate solid waste.

Some waste generated from the proposed action could be recycled (e.g., concrete, asphalt, paving and metals, etc.). Reuse or recycling of appropriate materials could reduce the amount of solid waste disposed of at landfills (either on or off base), resulting in an incrementally positive impact

to solid waste management. It could also provide alternate sources for required building materials, potentially reducing future impacts on nonrenewable natural resources.

4.4.2.3 Environmental Restoration Program

The existing JETC facility is sited above the North OU1 groundwater contamination plume. Prior to construction, an Active Soil Gas Investigation and an Industrial and Residential Health Screening would be conducted to determine if VOCs are present in sufficient concentrations to cause a potential indoor air VI concern. Based on the investigation and screening, if the levels are above acceptable thresholds, the installation of extraction wells and treatment system for the air contaminant would be required to be constructed around the existing JETC facility in order to mitigate the potential for subsurface contaminant VI. Currently, the number and size of the extraction wells and type of vapor controls, if any, have not been assessed. With the implementation of the VI mitigation system, no significant adverse effects of Alternative B are anticipated.

4.4.2.4 Alternative B Minimization Measures

The same minimization measures under Alternative A are recommended for Alternative B.

4.4.3 Alternative C Impacts

Under Alternative C, the existing JETC facility would remain operational and continue to be utilized for smaller jet engine testing. Testing for larger jet engines would occur at an off-base testing facility. Since the building is sited above a groundwater contamination plume, the same investigations and potential mitigation discussed in Alternative B would likely be needed for Alternative C to remain in operation. No significant adverse effects are anticipated.

4.4.3.1 Alternative C Minimization Measures

No minimization measures are required for Alternative C.

4.5 Cultural Resources

4.5.1 Alternative A Impacts

Ground disturbance within the project area has the potential to damage or destroy archaeological sites. Impacts could include, but are not limited to, excavation, off-road vehicle traffic, foot traffic, looting and erosion. However, according to the Edwards AFB General Plan, dated 2011 and the ICRMP, Alternative A is located in a low sensitivity area for cultural resources. No adverse effects to archaeological or paleontological resources are expected as a result of the proposed action.

The new JETC facility would be located in the same general area as Building 3804, which was recommended eligible for listing on the NRHP in 2008. However, it will be located approximately 577 yards south of the existing test cell, therefore vibrations from the testing of jet engines in the new JETC facility would be minimal and would not compromise the structural

integrity of the older building. Thus, adverse vibration impacts to Building 3804 would be minimal. No adverse effects to historic structures are anticipated.

4.5.1.1 Alternative A Minimization Measures

The following minimization measures are required or recommended:

- Contact the BHPO for compliance measures and cultural resources concerns;
- If any cultural materials not discussed in this report are discovered during project implementation, all work shall cease at the site of discovery and the BHPO shall be contacted immediately in accordance with 36 CFR 800 and AFI 32-7065; and
- Prior to construction, further consultation with the BHPO is required in order to flag exclusion zones to be installed around cultural sites in close proximity to work areas.

4.5.2 Alternative B Impacts

Building 3804 is a structure that has been determined to be eligible for listing on the NRHP. Repair and modification of Building 3804 to support the testing of new jet engines would have the potential to damage or destroy those characteristics of this structure, which make it unique and eligible for listing under Criterion C. Building 3804 and its test cells were engineered and acoustically treated to withstand high-thrust jet blasts and extreme sound and pressure fluctuations. These character-defining features would need to be preserved. Implementation of the measures described below would ensure that this results in a positive impact.

4.5.2.1 Alternative B Minimization Measures

In addition to the minimization measures recommended under Alternative A, the following measures are required:

- Repairs and modifications to Building 3804 would require a Section 106 review and consultation with the SHPO.
- To the extent possible, all repairs and modification of Building 3804 would adhere to the Secretary of the Interior's Standards for the Rehabilitation of Historic Properties (United States Department of the Interior, National Park Service 1997). Designs would ensure the preservation of the character-defining features of the building and would avoid damaging or destroying materials, features, or finishes that are important, while also considering economic and technical feasibility. This would include preserving distinctive features, finishes and construction techniques; avoiding the destruction of historic materials with new additions, exterior alterations, or related new construction; ensuring that new additions and adjacent/related construction would be undertaken in a manner that allows the unimpaired removal in the future; avoiding the creation of a false sense of history, such as adding elements from other buildings; and avoiding the removal of historic materials or alteration of features and spaces that characterize a building. Implementing these measures results in a positive impact.

4.5.3 Alternative C Impacts

Under Alternative C, the existing JETC facility would remain operational and continue to be utilized for smaller jet engine testing. Testing for larger jet engines would occur at an off-base testing facility. Continued use of Building 3804 could have the potential to further damage the structural integrity of the historic resource.

4.5.3.1 Alternative C Minimization Measures

Measures listed for Alternative B would be required if building modifications are undertaken.

4.6 NEPA Mandated Analysis

4.6.1 Cumulative Impacts

CEQ regulations implementing NEPA require agencies to consider the potential for cumulative impacts of proposed actions. 'Cumulative impact' is defined in 40 CFR 1508.7 as, "the impact on the environment, which results from the incremental impact of the action when added to other past, present (e.g., daily maintenance projects basewide, noise and air emissions from flights and destruction of habitat) and reasonably foreseeable future actions (e.g., planned main runway overhaul and test mission beddowns)." Cumulative impacts can result from individually minor, but collectively significant actions taking place over time.

Cumulative impacts are defined in this document as those that would result from the incremental impacts of the action when added to other past, present and reasonably foreseeable future actions. The following cumulative effects would be anticipated as a result of implementing Alternative A:

- ***Air Quality*** **–** Construction and operation of the new JETC facility would generate increases in emissions of criteria and other pollutants. However, such increases would be below *de minimis* thresholds and would be subject to all local, state and federal regulations to reduce emission levels. Thus, no significant cumulative impacts are anticipated.
- ***Noise*** **–** Site-specific and sporadic increases in noise pollution would occur during the construction of the new JETC facility and during the testing of jet engines. However, noise levels generated during the construction and operation of the new JETC facility fall within the defined noise contours for Edwards AFB and would not exceed established thresholds. Thus, cumulative effects to the ambient noise environment would be minimal.
- ***Water Resources*** **–** The current Edwards AFB water and wastewater infrastructure is adequate to support the construction and operation of the new JETC facility. Effects on the site hydrology and water quality from storm water runoff would be minimal. Alternative A would not result in cumulative adverse effects to water resources at Edwards AFB.
- ***Hazardous Materials and Waste*** **–** Hazardous materials and wastes used and generated during the construction and operation of the new JETC would be required to comply with

regulations described in Section 3.4.1. The amount of hazardous wastes generated is expected to be negligible and would be adequately accommodated within the existing HWSF. Alternative A could have a positive effect on solid waste management through reuse or recycling, which could reduce the amount of solid waste disposed of at landfills. Any potential effects from the groundwater contamination plume beneath the site would be mitigated with VI systems, as needed. Thus, effects from hazardous materials and wastes are not expected to be cumulatively significant under Alternative A.

- ***Cultural Resources*** **–** Alternative A would be constructed on previously disturbed vacant land. The project site is located in a low sensitivity area for cultural resources. No cultural resources would be adversely affected by the proposed action. Coordination with the BHPO would ensure that there are no adverse effects to undiscovered and unanticipated cultural resources. Thus, no cumulative adverse effects on cultural resources are expected.

Alternative B would repair and upgrade Building 3804, the existing JETC, to accommodate testing of new jet engines. Cumulative effects from Alternative B are expected to be similar to Alternative A for Air Quality, Noise, Water Resources and Hazardous Materials and Waste. Repairs and modifications to Building 3804 could result in positive impacts to the historic significance of the building. Implementation of recommended measures would ensure that Alternative B would not have a cumulatively adverse effect on cultural resources.

Alternative C would not change the existing conditions. However, continued use of Building 3804, the existing JETC, would eventually necessitate some repairs, which could affect the historic significance of the building. Thus, cumulative impacts under Alternative C would be similar to Alternative B.

4.6.2 Unavoidable Adverse Impacts

Unavoidable adverse impacts include those that are negative, occurring regardless of any identified minimization measures. Under Alternatives A, B and C, the following unavoidable adverse impacts would be expected:

- ***Air Quality*** **–** Pollutant emissions from jet engine testing are unavoidable. However, criteria and other pollutants generated would be below *de minimis* thresholds and would meet all local, state and federal air quality regulations.
- ***Noise*** **–** Noise level increases during the testing of jet engines are unavoidable. However, increases are within the defined noise contours for Edwards AFB and would not exceed established thresholds.
- ***Hazardous Materials and Waste*** **–** Exposure to dangers from the storage, handling and disposal of hazardous materials and wastes used and generated would be unavoidable. Compliance with all applicable standards and/or regulations addressing hazardous materials and waste management is required.

Under Alternatives B and C, the following unavoidable adverse impact would also be expected:

- ***Cultural Resources*** **–** Repairs and modifications to Building 3804 could have an unavoidable adverse effect to the historic significance of the building. Implementation of recommended measures would ensure effects are minimal.

4.6.3 Short-Term Uses Versus Long-Term Productivity of the Environment

Short-term uses of the environment include direct, construction-related disturbances and direct impacts associated with an increase in population and activity that occurs over a period typically less than five years. Long-term uses of the environment include those impacts occurring over a period of more than five years, including permanent resource loss.

Many of the activities and technologies proposed under Alternative A involve short-term adverse impacts to the environment (e.g., ground disturbance, construction noise and emissions, etc.), but would increase the quality or stability of a resource in the long-term by removing the need for further use of additional activities and potentially invasive technologies in sensitive resource areas (i.e., critical habitat or cultural sites).

Alternative A would construct a new JETC facility for the testing of new jet engines. This would remove the need to upgrade and modify Building 3804, the existing JETC facility, to accommodate new technologies. Under Alternative B, modifications to Building 3804, a historic resource eligible for listing to the NRHP, could adversely affect the historic significance of the building. Thus, the implementation of Alternative A, which would involve short-term adverse impacts to the environment, would result in the long-term historic sustainability of Building 3804.

4.6.4 Irreversible and Irretrievable Commitment of Resources

Irreversible and irretrievable resource commitments are related to the use of nonrenewable natural resources and the effects that the use of those resources will have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals, etc.) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of implementing an action (e.g., extinction of a rare or threatened species, or the disturbance of an important cultural resource site, etc.).

Some of the activities associated with implementing Alternative A would include a minor irreversible and irretrievable commitment of land, labor, capital, construction materials and energy, which would be required to construct and operate the new JETC facility. Implementation of Alternatives B and C would result in similar commitment of resource, but could also include the loss in value of an historic resource, Building 3804.

4.7 Assessment Topics Not Required by NEPA

4.7.1 Mitigation Monitoring and Reporting

To ensure compliance with mitigation measures, a mitigation monitoring and reporting program would be established. This plan would describe the mitigation measures in detail, establish a schedule for implementation and monitoring and set a schedule and procedures for reporting the monitoring results to appropriate agencies. This plan would be developed once the specific mitigation measures are approved by Edwards AFB and the Air Force Center for Environmental Excellence.

4.7.2 Growth Inducing Impacts

The proposed action is not expected to directly foster economic or population growth, additional housing, remove obstacles to growth, tax community service facilities, or encourage or facilitate other activities that cause significant environmental effects. Economic growth potential is limited by the fact that the proposed action would construct a new JETC facility, which would be operated by existing personnel and may employ a small number of new personnel. Operation of a new JETC facility would not induce a growth in population or housing demand. The proposed action is not anticipated to encourage or facilitate other activities that would result in significant growth inducing effects.

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7.0 LIST OF AGENCIES AND ORGANIZATIONS TO WHOM COPIES OF THE ENVIRONMENTAL ASSESSMENT ARE SENT

Edwards Air Force Base Library, 95 SPTG/SVRL, Edwards AFB, California

APPENDIX A

ANNUAL CRITERIA POLLUTANT EMISSIONS FROM AIRCRAFT ENGINE TESTING

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Appendix A

Annual Criteria Pollutant Emissions from Aircraft Engine Testing

Runup Emissions - TF33-P-103				Emission Indices, lbs/1000 lbs fuel						Emissions, lbs/year						Fuel Use	
Number of Engines Tested	Power Setting	Time Per Test (hrs/test)	Fuel Flow Rate (lbs/hr)	NOx	CO	HC	PM10	PM2.5	SOx	NOx	CO	HC	PM10	PM2.5	SOx	Bulk Density (lbs/Gal)	Qty Used (Gal)
	Idle	2.70	1,225	1.39	94.87	86.70	1.90	1.71	1.06	55.18	3,766.40	3,442.05	75.43	67.89	42.08		5,946.78
	Approach	0.00	4,831	6.36	5.23	1.31	0.35	0.32	1.06	0.00	0.00	0.00	0.00	0.00	0.00		0.00
12	Intermediate	0.45	5,855	7.86	3.48	0.98	0.68	0.61	1.06	248.51	110.03	30.99	21.50	19.29	33.51	6.676	4,736.00
	Military	1.35	7,634	12.05	1.99	0.98	0.39	0.35	1.06	1,490.31	246.12	121.20	48.23	43.29	131.10		18,525.58
	Afterburner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
										Total Annual Emissions TF33-P-103 (lbs/yr) =							29,208.36
										Total Annual Emissions TF33-P-103 (tpy) =							
										1,794.00	4,122.55	3,594.24	145.17	130.46	206.69		
										0.90	2.06	1.80	0.07	0.07	0.10		

Runup Emissions - F119-PW-100				Emission Indices, lbs/1000 lbs fuel						Emissions, lbs/year						Fuel Use	
Number of Engines Tested	Power Setting	Time Per Test (hrs/test)	Fuel Flow Rate (lbs/hr)	NOx	CO	HC	PM10	PM2.5	SOx	NOx	CO	HC	PM10	PM2.5	SOx	Bulk Density (lbs/Gal)	Qty Used (Gal)
	Idle	0.50	1,377	3.01	48.15	6.83	2.42	1.76	1.06	24.87	397.82	56.43	19.99	14.54	8.76		1,237.57
	Approach	0.00	2,740	6.59	7.94	0.34	1.95	1.73	1.06	0.00	0.00	0.00	0.00	0.00	0.00		0.00
12	Intermediate	0.00	10,100	12.40	2.14	0.53	1.41	1.10	1.06	0.00	0.00	0.00	0.00	0.00	0.00	6.676	0.00
	Military	0.05	18,612	19.81	0.75	0.31	1.12	0.97	1.06	221.22	8.38	3.46	12.51	10.83	11.84		1,672.74
	Afterburner	0.02	50,170	7.37	16.10	0.18	0.86	0.76	1.06	73.95	161.55	1.81	8.63	7.63	10.64		1,503.00
										Total Annual Emissions F119-PW-100 (lbs/yr) =							4,413.30
										Total Annual Emissions F119-PW-100 (tpy) =							
										320.04	567.74	61.70	41.13	33.00	31.23		
										0.16	0.28	0.03	0.02	0.02	0.02		

Runup Emissions - F135-PW-100				Emission Indices, lbs/1000 lbs fuel						Emissions, lbs/year						Fuel Use	
Number of Engines Tested	Power Setting	Time Per Test (hrs/test)	Fuel Flow Rate (lbs/hr)	NOx	CO	HC	PM10	PM2.5	SOx	NOx	CO	HC	PM10	PM2.5	SOx	Bulk Density (lbs/Gal)	Qty Used (Gal)
	Idle	1.00	2,128	2.00	22.00	0.05	2.42	1.76	1.06	51.07	561.79	1.28	61.80	44.94	27.07		3,825.04
	Approach	0.00	6,730	9.00	1.20	0.01	1.95	1.73	1.06	0.00	0.00	0.00	0.00	0.00	0.00		0.00
12	Intermediate	0.00	13,390	14.97	0.57	0.53	1.41	1.10	1.06	0.00	0.00	0.00	0.00	0.00	0.00	6.676	0.00
	Military	0.17	19,003	19.81	0.75	0.31	1.12	0.97	1.06	752.90	28.50	11.78	42.57	36.87	40.29		5,692.93
	Afterburner	0.08	44,530	49.22	0.07	0.18	0.86	0.76	1.06	2,191.78	3.06	8.02	38.30	33.84	47.20		6,670.09
										Total Annual Emissions F135-PW-100 (lbs/yr) =							16,188.06
										Total Annual Emissions F135-PW-100 (tpy) =							
										2,995.75	593.36	21.07	142.66	115.65	114.56		
										1.50	0.30	0.01	0.07	0.06	0.06		

Runup Emissions - F108-CF-100				Emission Indices, lbs/1000 lbs fuel						Emissions, lbs/year						Fuel Use	
Number of Engines Tested	Power Setting	Time Per Test (hrs/test)	Fuel Flow Rate (lbs/hr)	NOx	CO	HC	PM10	PM2.5	SOx	NOx	CO	HC	PM10	PM2.5	SOx	Bulk Density (lbs/Gal)	Qty Used (Gal)
	Idle	2.70	1,136	3.88	23.65	0.22	2.07	0.16	1.06	142.81	870.47	8.22	76.30	5.96	39.01		5,513.24
	Approach	0.00	2,547	5.73	8.57	0.09	1.55	1.13	1.06	0.00	0.00	0.00	0.00	0.00	0.00		0.00
12	Intermediate	0.45	5,650	11.04	2.32	0.07	0.65	0.13	1.06	336.83	70.78	2.14	0.00	0.00	32.34	6.676	4,570.10
	Military	1.35	6,458	12.05	0.36	0.02	1.59	1.02	1.06	1,260.67	37.66	2.03	0.00	0.00	110.90		15,671.00
	Afterburner	0.00	7,727	12.05	0.36	0.60	1.59	1.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
										Total Annual Emissions F108-CF-100 (lbs/yr) =							25,754.34
										Total Annual Emissions F108-CF-100 (tpy) =							
										1,740.31	978.92	12.39	76.30	5.96	182.25		
										0.87	0.49	0.01	0.04	0.00	0.09		

Appendix A

Annual Criteria Pollutant Emissions from Aircraft Engine Testing

Runup Emissions - F117-PW-100				Emission Indices, lbs/1000 lbs fuel						Emissions, lbs/year						Fuel Use	
Number of Engines Tested	Power Setting	Time Per Test (hrs/test)	Fuel Flow Rate (lbs/hr)	NOx	CO	HC	PM10	PM2.5	SOx	NOx	CO	HC	PM10	PM2.5	SOx	Bulk Density (lbs/Gal)	Qty Used (Gal)
10	Idle	2.70	978	3.72	22.43	2.05	10.54	8.64	1.06	98.23	592.29	54.13	278.32	228.15	27.99	6.676	3,955.36
	Approach	0.00	4,645	15.47	0.51	0.43	5.53	5.10	1.06	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	Intermediate	0.45	10,408	32.74	0.32	0.39	2.31	1.42	1.06	1,533.41	14.99	18.27	108.19	66.51	49.65		7,015.58
	Military	1.35	13,355	40.99	0.14	0.27	0.00	0.00	1.06	7,390.42	24.81	48.03	0.00	0.00	191.11		27,006.27
	Afterburner	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
									Total Annual Emissions F117-PW-100 (lbs/yr) =	9,022.06	632.08	120.43	386.51	294.65	268.75		37,977.21
									Total Annual Emissions F117-PW-100 (tpy) =	4.51	0.32	0.06	0.19	0.15	0.13		

Runup Emissions - F103-GE-100				Emission Indices, lbs/1000 lbs fuel						Emissions, lbs/year						Fuel Use	
Number of Engines Tested	Power Setting	Time Per Test (hrs/test)	Fuel Flow Rate (lbs/hr)	NOx	CO	HC	PM10	PM2.5	SOx	NOx	CO	HC	PM10	PM2.5	SOx	Bulk Density (lbs/Gal)	Qty Used (Gal)
2	Idle	2.70	1,706	6.14	61.79	21.80	2.75	2.48	1.06	56.56	569.21	200.83	25.33	22.80	9.77	6.676	1,379.93
	Approach	0.00	5,238	49.76	4.30	1.00	1.19	1.07	1.06	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	Intermediate	0.33	15,873	466.96	0.50	0.70	0.89	0.80	1.06	4,941.37	5.29	7.41	9.42	8.48	11.22		1,585.08
	Military	0.50	19,738	721.23	0.50	0.60	1.18	1.06	1.06	14,235.64	9.87	11.84	23.29	20.96	20.92		2,956.56
	Afterburner	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
									Total Annual Emissions F103-GE-100 (lbs/yr) =	19,233.57	584.38	220.07	58.04	52.24	41.90		5,921.57
									Total Annual Emissions F103-GE-100 (tpy) =	9.62	0.29	0.11	0.03	0.03	0.02		
									Total Annual Jet Engine Testing Emissions (tpy) =	17.55	3.74	2.01	0.42	0.32	0.42		119,462.85

Calculation of Annual PTE (lbs/yr)

Number of Engines Tested x Time Per Test (hrs/test) x Fuel Flow Rate (lbs/hr) x Emission Indices (lb/1,000 lbs fuel) = Potential Emissions (lb/yr)

Calculation of Annual PTE (tpy)

Potential Emissions (lbs/yr) x 2000 = Potential Emissions (tpy)

Calculation of Annual Fuel Use (gals)

Number of Engines Tested x Time Per Test (hrs/test) x Fuel Flow Rate (lbs/hr) x Bulk Density (lbs/gal) = Fuel Use (gals/yr)

GHG Pollutant Constituent	Emission Factor[1] (KG /gallon)	Emission Factor[2] (lb/gallon)
CO_2	9.57	21.079
CH_4	0.00031	0.0007
N_2O	0.00027	0.0006

GHG emission factors from: http://www.climateregistry.org/resources/docs/protocols/grp/GRP_3.1_January2009.pdf, Appendix C, Tables C3, C5, and C6.

	Constituent	Annual Potential to Emit (lb/yr) (2)	Annual Potential to Emit (short tons/yr)	Annual Potential to Emit (metric tons/yr)
GWP	(Global Warming Potential)			
1	CO_2	2,518,192.65	1,259.10	1,142.25
21	CH_4 (in CO_2e)	1,713.00	0.86	0.78
310	N_2O (in CO_2e)	22,024.32	11.01	9.99
	Total GHG (in CO_2e):	2,541,929.97	1,270.96	1,153.02

APPENDIX B

ANNUAL HAZARDOUS AIR POLLUTANT EMISSIONS FROM AIRCRAFT ENGINE TESTING

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Appendix B

Annual Hazardous Air Poolutant Emissions from Aircraft Engine Testing

Runup Emissions - TF33-P-103				Emission Indices, lbs/1000 lbs fuel									Emissions, lbs/year								
Number of Engines Tested	Power Setting	Total TIM per setting, hours	Fuel Flow Rate (lbs/hr)	Acetal-dehyde	Acrolein	Benzene	Ethyle-benzene	Formal-dehyde	Naph-thalene	Styrene	Toluene	Xylenes	Acetal-dehyde	Acrolein	Benzene	Ethyle-benzene	Formal-dehyde	Naph-thalene	Styrene	Toluene	Xylenes
12	Idle	1.50	1,225	0.01	NA	0.71	0.09	0.94	0.21	0.11	0.27	0.20	0.22	0.00	15.66	1.92	20.73	4.63	2.43	5.96	4.41
	Approach	0.10	4,831	0.00	NA	0.01	0.00	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	3.83	0.01	0.01	0.01	0.01
	Intermediate	0.02	5,855	NA	NA	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00
	Military	0.02	7,634	NA	NA	0.00	NA	NA	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Afterburner	0.15	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
													Total Annual Emissions TF33-P-103 (lbs/yr) =	0.22	0.00	15.73	1.92	24.59	4.64	2.43	5.97	4.43
													Total Annual Emissions TF33-P-103 (tpy) =	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00

Runup Emissions - F119-PW-100				Emission Indices, lbs/1000 lbs fuel									Emissions, lbs/year								
Number of Engines Tested	Power Setting	Total TIM per setting, hours	Fuel Flow Rate (lbs/hr)	Acetal-dehyde	Acrolein	Benzene	Ethyle-benzene	Formal-dehyde	Naph-thalene	Styrene	Toluene	Xylenes	Acetal-dehyde	Acrolein	Benzene	Ethyle-benzene	Formal-dehyde	Naph-thalene	Styrene	Toluene	Xylenes
12	Idle	1.50	1,377	0.11	0.04	0.11	0.02	0.01	0.00	0.03	0.06	0.07	2.73	0.89	2.73	0.40	0.25	0.00	0.77	1.59	1.66
	Approach	0.10	2,740	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.12	0.00	0.00	0.00	0.00
	Intermediate	0.02	10,110	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00
	Military	0.02	18,612	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00
	Afterburner	0.15	50,170	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A									
													Total Annual Emissions F119-PW-100 (lbs/yr) =	2.76	0.89	2.74	0.40	0.45	0.00	0.77	1.59	1.67
													Total Annual Emissions F119-PW-100 (tpy) =	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Runup Emissions - F135-PW-100				Emission Indices, lbs/1000 lbs fuel									Emissions, lbs/year								
Number of Engines Tested	Power Setting	Total TIM per setting, hours	Fuel Flow Rate (lbs/hr)	Acetal-dehyde	Acrolein	Benzene	Ethyle-benzene	Formal-dehyde	Naphthalene	Styrene	Toluene	Xylenes	Acetaldehyde	Acrolein	Benzene	Ethyle-benzene	Formal-dehyde	Naphthalene	Styrene	Toluene	Xylenes
12	Idle	1.50	2,128	0.11	0.04	0.11	0.02	0.01	0.00	0.03	0.06	0.07	4.21	1.38	4.21	0.61	0.38	0.00	1.19	2.45	2.57
	Approach	0.10	6,730	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.05	0.00	0.03	0.00	0.29	0.00	0.00	0.00	0.01
	Intermediate	0.02	13,390	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00
	Military	0.02	19,003	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00
	Afterburner	0.15	44,530	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A									
													Total Annual Emissions F135-PW-100 (lbs/yr) =	4.28	1.38	4.24	0.62	0.77	0.00	1.19	2.45	2.58
													Total Annual Emissions F135-PW-100 (tpy) =	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Runup Emissions - F108-CF-100				Emission Indices, lbs/1000 lbs fuel									Emissions, lbs/year								
Number of Engines Tested	Power Setting	Total TIM per setting, hours	Fuel Flow Rate (lbs/hr)	Acetal-dehyde	Acrolein	Benzene	Ethyle-benzene	Formal-dehyde	Naph-thalene	Styrene	Toluene	Xylenes	Acetal-dehyde	Acrolein	Benzene	Ethyle-benzene	Formal-dehyde	Naph-thalene	Styrene	Toluene	Xylenes
12	Idle	1.50	1,136	0.0E+00	N/A	1.4E-02	1.0E-03	9.5E-02	2.9E-03	1.5E-03	9.0E-03	1.7E-03	0.00	0.00	0.29	0.02	1.94	0.06	0.03	0.18	0.03
	Approach	0.10	2,547	N/A	N/A	3.4E-03	8.1E-04	1.5E-02	0.0E+00	N/A	6.2E-03	2.1E-03	0.00	0.00	0.01	0.00	0.05	0.00	0.00	0.02	0.01
	Intermediate	0.02	5,650	N/A	N/A	8.3E-04	N/A	5.6E-03	N/A	N/A	1.4E-03	6.3E-04	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
	Military	0.02	7,727	N/A	N/A	5.9E-04	N/A	7.0E-03	N/A	N/A	1.1E-03	5.0E-04	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
	Afterburner	0.15	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
													Total Annual Emissions F108-CF-100 (lbs/yr) =	0.00	0.00	0.30	0.02	2.01	0.06	0.03	0.21	0.04
													Total Annual Emissions F108-CF-100 (tpy) =	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix B

Annual Hazardous Air Poolutant Emissions from Aircraft Engine Testing

Runup Emissions - F117-PW-100				Emission Indices, lbs/1000 lbs fuel									Emissions, lbs/year								
Number of Engines Tested	Power Setting	Total TIM per setting, hours	Fuel Flow Rate (lbs/hr)	Acetal-dehyde	Acrolein	Benzene	Ethyle-benzene	Formal-dehyde	Naph-thalene	Styrene	Toluene	Xylenes	Acetal-dehyde	Acrolein	Benzene	Ethyle-benzene	Formal-dehyde	Naph-thalene	Styrene	Toluene	Xylenes
10	Idle	1.50	978	1.2E-02	N/A	2.2E-02	3.0E-03	2.3E-01	2.4E-03	1.5E-03	6.6E-03	3.2E-03	0.18	0.00	0.32	0.04	3.37	0.04	0.02	0.10	0.05
	Approach	0.10	4,645	N/A	N/A	8.9E-04	N/A	1.7E-02	N/A	N/A	1.4E-03	7.0E-04	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.01	0.00
	Intermediate	0.02	10,408	N/A	N/A	6.3E-04	N/A	9.5E-03	N/A	N/A	1.1E-03	5.5E-04	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
	Military	0.02	13,355	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Afterburner	0.15	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
												Total Annual Emissions F117-PW-100 (lbs/yr) =	0.18	0.00	0.33	0.04	3.47	0.04	0.02	0.11	0.05
												Total Annual Emissions F117-PW-100 (tpy) =	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Runup Emissions - F103-GE-100				Emission Indices, lbs/1000 lbs fuel									Emissions, lbs/year								
Number of Engines Tested	Power Setting	Total TIM per setting, hours	Fuel Flow Rate (lbs/hr)	Acetal-dehyde	Acrolein	Benzene	Ethyle-benzene	Formal-dehyde	Naph-thalene	Styrene	Toluene	Xylenes	Acetal-dehyde	Acrolein	Benzene	Ethyle-benzene	Formal-dehyde	Naph-thalene	Styrene	Toluene	Xylenes
2	Idle	1.50	1,876	0.0E+00	N/A	1.4E-02	1.0E-03	9.5E-02	2.9E-03	1.5E-03	9.0E-03	1.7E-03	0.00	0.00	0.08	0.01	0.53	0.02	0.01	0.05	0.01
	Approach	0.10	5,341	N/A	N/A	3.4E-03	8.1E-04	1.5E-02	0.0E+00	N/A	6.2E-03	2.1E-03	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.00
	Intermediate	0.02	15,873	N/A	N/A	8.3E-04	N/A	5.6E-03	N/A	N/A	1.4E-03	6.3E-04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Military	0.02	19,929	N/A	N/A	5.9E-04	N/A	7.0E-03	N/A	N/A	1.1E-03	5.0E-04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Afterburner	0.15	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
												Total Annual Emissions F103-GE-100 (lbs/yr) =	0.00	0.00	0.08	0.01	0.56	0.02	0.01	0.06	0.01
												Total Annual Emissions F103-GE-100 (tpy) =	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
												Total Annual Jet Engine Testing Emissions (lbs/yr) =	7.43E+00	2.27E+00	2.34E+01	3.02E+00	3.18E+01	4.75E+00	4.46E+00	1.04E+01	8.78E+00
												Total Annual Jet Engine Testing Emissions (tpy) =	3.72E-03	1.14E-03	1.17E-02	1.51E-03	1.59E-02	2.38E-03	2.23E-03	5.19E-03	4.39E-03

Calculation of Annual PTE (lbs/yr)

Number of Engines Tested x Time Per Test (hrs/test) x Fuel Flow Rate (lbs/hr) x Emission Indices (lb/1,000 lbs fuel) = Potential Emissions (lb/yr)

Calculation of Annual PTE (tpy)

Potential Emissions (lbs/yr) x 2000 = Potential Emissions (tpy)

APPENDIX C

JET ENGINE TEST CELL EMISSION FACTORS

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Appendix C

Jet Engine Test Cell Emission Factors

Aircraft Engine	Power Setting	Fuel Flowrate (lb/hr)	Emission Factors in lb/1,000 lb fuel burned (lb/ 1,000lb)					
			NOx	CO	VOC	PM_{10}	$PM_{2.5}$	SOx[3]
TF33-P-103[1]	Idle	1225	1.39	94.87	86.70	1.90	1.71	1.06
	Approach	4831	6.36	5.23	1.31	0.35	0.32	1.06
	Intermediate	5855	7.86	3.48	0.98	0.68	0.61	1.06
	Military	7634	12.05	1.99	0.98	0.39	0.35	1.06
F119-PW-100[4]	Idle	1377	3.01	48.15	6.83	2.42	1.76	1.06
	Approach	2740	6.59	7.94	0.34	1.95	1.73	1.06
	Intermediate	10100	12.40	2.14	0.53	1.41	1.10	1.06
	Military	18612	19.81	0.75	0.31	1.12	0.97	1.06
	Afterburner	50170	7.37	16.10	0.18	0.86	0.76	1.06
F135-PW-100[2]	Idle	2128	2.00	22.00	0.05	2.42	1.76	1.06
	Approach	6730	9.00	1.20	0.01	1.95	1.73	1.06
	Intermediate	13390	14.97	0.57	0.53	1.41	1.10	1.06
	Military	19003	19.81	0.75	0.31	1.12	0.97	1.06
	Afterburner	44530	49.22	0.07	0.18	0.86	0.76	1.06
F108-CF-100[4]	Idle	1136	3.88	23.65	0.22	2.07	0.16	1.06
	Approach	2547	5.73	8.57	0.09	1.55	1.13	1.06
	Intermediate (70%)	5650	11.04	2.32	0.07	0.65	0.13	1.06
	Intermediate (78%)	6458	12.05	0.36	0.02	1.59	1.02	1.06
	Military	7727	12.05	0.36	0.60	1.59	1.59	
F117-PW-100[4]	Idle	978	3.72	22.43	2.05	10.54	8.64	1.06
	Approach	4645	15.47	0.51	0.43	5.53	5.10	1.06
	Intermediate	10408	32.74	0.32	0.39	2.31	1.42	1.06
	Military	13355	40.99	0.14	0.27	0.00	0.00	1.06
F103-GE-100[4][5]	Idle	1706	6.14	61.79	21.80	2.75	2.48	1.06
	Approach	5238	49.76	4.30	1.00	1.19	1.07	1.06
	Intermediate	15873	466.96	0.50	0.70	0.89	0.80	1.06
	Military	19738	721.23	0.50	0.60	1.18	1.06	1.06

Appendix C

Jet Engine Test Cell Emission Factors

Aircraft Engine	Power Setting	Fuel Flowrate (lb/hr)	lb/1000lb Acetaldehyde	lb/1000lb Acrolein	lb/1000lb Benzene	lb/1000lb Ethyl benzene	lb/1000lb Formaldehyde	lb/1000lb Naphthalene	lb/1000lb Styrene	lb/1000lb Toluene	lb/1000lb Xylenes
TF33-P-103[1]	Idle	1225	1.00E-02	NA	7.10E-01	8.70E-02	9.40E-01	2.10E-01	1.10E-01	2.70E-01	2.00E-01
	Approach	4831	0.00E+00	NA	1.10E-02	8.20E-04	6.60E-01	1.10E-03	1.20E-03	2.30E-03	2.40E-03
	Intermediate	5855	NA	NA	4.10E-03	6.20E-04	2.30E-02	7.40E-04	5.80E-04	2.70E-03	1.40E-03
	Military	7634	NA	NA	9.60E-04	NA	NA	1.30E-04	NA	9.50E-04	1.20E-03
F119-PW-100[4]	Idle	1377	1.10E-01	3.60E-02	1.10E-01	1.60E-02	1.00E-02	0.00E+00	3.10E-02	6.40E-02	6.70E-02
	Approach	2740	6.80E-03	0.00E+00	3.30E-03	4.00E-04	3.60E-02	0.00E+00	4.00E-04	3.00E-04	9.00E-04
	Intermediate	10110	2.60E-03	0.00E+00	7.00E-04	5.00E-04	2.50E-02	0.00E+00	0.00E+00	0.00E+00	5.00E-04
	Military	18612	8.00E-04	0.00E+00	5.00E-04	2.00E-04	7.60E-03	0.00E+00	0.00E+00	0.00E+00	5.00E-04
	Afterburner	50170	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F135-PW-100[2]	Idle	2128	1.10E-01	3.60E-02	1.10E-01	1.60E-02	1.00E-02	0.00E+00	3.10E-02	6.40E-02	6.70E-02
	Approach	6730	6.80E-03	0.00E+00	3.30E-03	4.00E-04	3.60E-02	0.00E+00	4.00E-04	3.00E-04	9.00E-04
	Intermediate	13390	2.60E-03	0.00E+00	7.00E-04	5.00E-04	2.50E-02	0.00E+00	0.00E+00	0.00E+00	5.00E-04
	Military	19003	8.00E-04	0.00E+00	5.00E-04	2.00E-04	7.60E-03	0.00E+00	0.00E+00	0.00E+00	5.00E-04
	Afterburner	44530	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F108-CF-100[4]	Idle	1136	0.0E+00	N/A	1.4E-02	1.0E-03	9.5E-02	2.9E-03	1.5E-03	9.0E-03	1.7E-03
	Approach	2547	N/A	N/A	3.4E-03	8.1E-04	1.5E-02	0.0E+00	N/A	6.2E-03	2.1E-03
	Intermediate (70%)	5650	N/A	N/A	8.3E-04	N/A	5.6E-03	N/A	N/A	1.4E-03	6.3E-04
	Military	7727	N/A	N/A	5.9E-04	N/A	7.0E-03	N/A	N/A	1.1E-03	5.0E-04
F117-PW-100[4]	Idle	978	1.2E-02	N/A	2.2E-02	3.0E-03	2.3E-01	2.4E-03	1.5E-03	6.6E-03	3.2E-03
	Approach	4645	N/A	N/A	8.9E-04	N/A	1.7E-02	N/A	N/A	1.4E-03	7.0E-04
	Intermediate	10408	N/A	N/A	6.3E-04	N/A	9.5E-03	N/A	N/A	1.1E-03	5.5E-04
	Military	13355	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F103-GE-100[4][5]	Idle	1876	0.0E+00	N/A	1.4E-02	1.0E-03	9.5E-02	2.9E-03	1.5E-03	9.0E-03	1.7E-03
	Approach	5341	N/A	N/A	3.4E-03	8.1E-04	1.5E-02	0.0E+00	N/A	6.2E-03	2.1E-03
	Intermediate	15873	N/A	N/A	8.3E-04	N/A	5.6E-03	N/A	N/A	1.4E-03	6.3E-04
	Military	19929	N/A	N/A	5.9E-04	N/A	7.0E-03	N/A	N/A	1.1E-03	5.0E-04

Notes:

1. Fuel flow rates and emission factors apply Air Emissions Factor Guide to Air Force Mobile Sources, December 2009, for the TF33-P-102 as recommended by Edwards AFB (Meeting with Mr. Gregory P. Peria WS-17, DAF, Production Superintendant, 412 MXS/MXMP on 18 May 2012). HAP emission factors apply surrogate values from the TF33-P-102.
2. F135 criteria pollutant emission factors provided by AFCEE. HAP emission factors for F135 were unavailable; therefore, surrogate emission factors applied the F119 HAP emission factors.
3. EFSOx = S * 20

Where,

EFSox = SOx emission factor (lb SOx/1000 lb fuel)

S = Weight percent sulfur content of the fuel = 0.07. Air Emissions Factor Guide to Air Force Mobile Sources, December 2009.

20 = Conversion factor derived by converting the weight percent of the fuel into units of lb/1000 lb. Air Emissions Factor Guide to Air Force Mobile Sources, December 2009.

4. Draft 2012 Air Emissions Factor Guide to Air Force Mobile Sources.
5. No data provided for the F103-GE-100 HAPs. Surrogate emission factors applied the F109-CF-100.

APPENDIX D

PROPOSED NATURAL GAS FIRED SMALL BOILER (<10 MMBtu/hr)

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Appendix D

Proposed Natural Gas Fired Small Boiler (<10 MMBtu/hr)

Section 1 Data Required to Calculate Emissions for CE Boilers (<10 MMBtu/hr)

	Unit	Building	Manufacturer	Model #	Rated Heat Input (BTU/hr)	Hours of Operation (hrs)	Max Hourly Heat Input (MMBtu/hr)	Max Annual Heat Input (MMBtu/yr)	Max Hourly Fuel Usage (ft^3/hr)	Max Annual Fuel Usage (ft^3/yr)
	Boilers <10 MMBtu/hr									
1	Boiler	38XX	To be determined	To be determined	1,375,000	8,760	1.375	12,045	1348.039	11,808,823.5
	Total:						**1.375**	**12,045**	**1,348**	**11,808,824**

(1) Natural gas higher heating factor of 1,020 Btu/scf was obtained from AP-42, Section 1.4, Table 1.4-1, Note a.

Section 2 Calculation of Fuel Usage for Boilers <10 MMBtu/hr

2.1 Annual Fuel Usage

Annual fuel usage is based on all units operating simultaneously at 100% load.
Annual fuel usage = 11,808,824 ft^3/yr

2.2 Hourly PTE Fuel Usage

Hourly potential to emit fuel usage is based on all units operating simultaneously.

Total heat input; this class = 1.375 MMBtu/hr
Fuel usage = 1,348 ft^3/hr
Fuel usage = Total heat input, this class (MMBtu/hr) ÷ fuel heat content (BTU/ft3) x 10^6 Btu/MMBtu

Proposed Natural Gas Fired Small Boiler (<10 MMBtu/hr)

Section 3 BACT Level Emission factors, from Santa Barbara County APCD for NOx and CO, AP-42 (7/98), Section 1.4 Tables 1.4-1 and 1.4-2

Constituent	Emission Factor (lb/MMBtu)	
CO	0.0740	
NOx	0.0140	
Particulate [1]	0.0075	(PM10 and PM 2.5)
SO_2 [2]	0.0141	
VOC, non-methane	0.0054	
GHG Pollutant Constituent	**Emission Factor[3] (lb/MMBtu)**	**Emission Factor[3] (kg/MMBtu)**
CO_2	116.9	53.06
CH_4	0.024	0.011
N_2O	0.001	0.0006

(1) All particulate is assumed to be less than 1.0 micrometers in diameter. Assumes PM10 = 100% of total particulate, see AP-42, Table 1.4-1.

(2) Sulfur content based on PUC quality natural gas with a total reduced sulfur content of 85 ppmvd (Ref. PUC General Order 58A).

(3) GHG emission factors from: http://www.climateregistry.org/resources/docs/protocols/grp/GRP_3.1_January2009.pdf, Appendix C, Tables C7 and C8.

Section 4 Calculation of Criteria Pollutant Emission Rates

Constituent	Hourly Potential to Emit (lb/hr) [1]	Annual Potential to Emit (lb/yr) [2]	Annual Potential to Emit (ton/yr)
CO	0.10	891.33	0.45
NOx	0.02	168.63	0.08
PM2.5	0.01	89.75	0.04
PM10	0.01	89.75	0.04
SO_2	0.02	169.63	0.08
VOC	0.01	64.95	0.03

GWP	(Global Warming Potential)	Hourly Potential to Emit (lb/hr) [1]	Annual Potential to Emit (lb/yr) [2]	Annual Potential to Emit (short tons/yr) [3, 4]	Annual Potential to Emit (metric tons/yr) [3, 4]
1	CO_2	160.70	1,407,726.21	703.86	639.11
21	CH_4 (in CO_2e)	0.70	6,128.62	3.06	2.78
310	N_2O (in CO_2e)	0.56	4,934.74	2.47	2.24
	Total GHG (in CO_2e):	161.96	1,418,789.57	709.39	644.13

(1) - PTE for PM10 and PM2.5 are the same.

(2) - Annual potential to emit is based on 8,760 hrs/yr.

(3) - GHG emission factors from: http://www.climateregistry.org/resources/docs/protocols/grp/GRP_3.1_January2009.pdf, Appendix C, Table C1.

(4) - GHG emissions are presented in short tons/yr as well as metric tons/yr.

4.1 Calculation of Hourly PTE

Emission Factor (lb/MMBtu) x Heat Input (MMBtu/hr) = Emissions (lb/hr)

4.2 Calculation of Annual PTE

Hourly PTE (lb/hr) x 8760 hr/yr = Potential Emissions (lb/yr)

Proposed Natural Gas Fired Small Boiler (<10 MMBtu/hr)

Section 5 Emission Rate Calculations for Organic HAPs
Emission factors, from AP-42 (7/98), Section 1.4 Table 1.4-3

Constituent	Emission Factor (lb/mmcf)	Hourly Potential to Emit (lb/hr)	Annual Potential to Emit (lb/yr)	Annual Potential to Emit (ton/yr)
2-Methylnaphthalene	2.40E-05	3.24E-08	2.83E-04	1.42E-07
3-Methylchloranthrene	1.80E-06	2.43E-09	2.13E-05	1.06E-08
7,12-Dimethylbenz(a)anthracene	1.60E-05	2.16E-08	1.89E-04	9.45E-08
Acenaphthene	1.80E-06	2.43E-09	2.13E-05	1.06E-08
Anthracene	2.40E-06	3.24E-09	2.83E-05	1.42E-08
Benz(a)anthracene	1.80E-06	2.43E-09	2.13E-05	1.06E-08
Benzene	2.10E-03	2.83E-06	2.48E-02	1.24E-05
Benzo(a)pyrene	1.20E-06	1.62E-09	1.42E-05	7.09E-09
Benzo(b)fluoranthene	1.80E-06	2.43E-09	2.13E-05	1.06E-08
Benzo(g,h,i)perylene	1.20E-06	1.62E-09	1.42E-05	7.09E-09
Benzo(k)fluoranthene	1.80E-06	2.43E-09	2.13E-05	1.06E-08
Chrysene	1.80E-06	2.43E-09	2.13E-05	1.06E-08
Dibenzo(a,h)anthracene	1.20E-06	1.62E-09	1.42E-05	7.09E-09
Dichlorobenzene	1.20E-03	1.62E-06	1.42E-02	7.09E-06
Fluoranthene	3.00E-06	4.04E-09	3.54E-05	1.77E-08
Fluorene	2.80E-06	3.77E-09	3.31E-05	1.65E-08
Formaldehyde	7.50E-02	1.01E-04	8.86E-01	4.43E-04
Hexane	1.80E+00	2.43E-03	2.13E+01	1.06E-02
Indeno(1,2,3-cd)pyrene	1.80E-06	2.43E-09	2.13E-05	1.06E-08
Naphthalene	6.10E-04	8.22E-07	7.20E-03	3.60E-06
Phenanathrene	1.70E-05	2.29E-08	2.01E-04	1.00E-07
Pyrene	5.00E-06	6.74E-09	5.90E-05	2.95E-08
Toluene	3.40E-03	4.58E-06	4.02E-02	2.01E-05
Total		0.00	22.23	0.01

5.1 Calculation of Annual Emissions
Emission Factor (lb/mmcf) x Fuel Usage (cf/yr)/ 10^6 cf/mmcf = Actual Emissions (lb/yr)
Actual Emissions (ton/yr) = Actual Emissions (lb/yr) / 2000 lbs/ton

5.2 Calculation of Hourly PTE
Emission Factor (lb/mmcf) x Fuel Usage (cf/hr) / 10^6 cf/mmcf = Emissions (lb/hr)

5.3 Calculation of Annual PTE
Hourly PTE (lb/hr) x 8760 hr/yr = Potential Emissions (lb/yr)
Potential Emissions (ton/yr) = Potential Emissions (lb/yr) / 2000 lbs/ton

APPENDIX E

BASELINE NATURAL GAS FIRED SMALL BOILER (<10 MMBtu/hr)

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Baseline Natural Gas Fired Small Boiler (<10 MMBtu/hr)

Section 1 Data Required to Calculate Emissions for CE Boilers (<10 MMBtu/hr)

	Unit	Building	Manufacturer	Model #	Rated Heat Input (BTU/hr)	Hours of Operation (hrs)	Max Hourly Heat Input (MMBtu/hr)	Max Annual Heat Input (MMBtu/yr)	Max Hourly Fuel Usage (ft^3/hr)	Max Annual Fuel Usage (ft^3/yr)
	Boilers <10 MMBtu/hr									
1	Boiler	38XX	To be determined	To be determined	1,375,000	8,760	1.375	12,045	1348.039	11,808,823.5
	Total:						**1.375**	**12,045**	**1,348**	**11,808,824**

(1) Natural gas higher heating factor of 1,020 Btu/scf was obtained from AP-42, Section 1.4, Table 1.4-1, Note a.

Section 2 Calculation of Fuel Usage for Boilers <10 MMBtu/hr

2.1 Annual Fuel Usage

Annual fuel usage is based on all units operating simultaneously at 100% load.
Annual fuel usage = 11,808,824 ft^3/yr

2.2 Hourly PTE Fuel Usage

Hourly potential to emit fuel usage is based on all units operating simultaneously.

Total heat input, this class = 1.375 MMBtu/hr
Fuel usage = 1,348 ft^3/hr
Fuel usage = Total heat input, this class (MMBtu/hr) ÷ fuel heat content (BTU/ft3) x 10^6 Btu/MMBtu

Baseline Natural Gas Fired Small Boiler (<10 MMBtu/hr)

Section 3 BACT Level Emission factors, from Santa Barbara County APCD for NOx and CO, AP-42 (7/98), Section 1.4 Tables 1.4-1 and 1.4-2

Constituent	Emission Factor (lb/MMBtu)	
CO	0.0740	
NOx	0.0140	
Particulate [1]	0.0075	(PM10 and PM 2.5)
SO_2 [2]	0.0141	
VOC, non-methane	0.0054	
GHG Pollutant Constituent	**Emission Factor[3] (lb/MMBtu)**	**Emission Factor[3] (kg/MMBtu)**
CO_2	116.9	53.06
CH_4	0.024	0.011
N_20	0.001	0.0006

(1) All particulate is assumed to be less than 1.0 micrometers in diameter. Assumes PM10 = 100% of total particulate, see AP-42, Table 1.4-1.

(2) Sulfur content based on PUC quality natural gas with a total reduced sulfur content of 85 ppmvd (Ref. PUC General Order 58A). .

(3) GHG emission factors from: http://www.climateregistry.org/resources/docs/protocols/grp/GRP_3.1_January2009.pdf, Appendix C, Tables C7 and C8.

Section 4 Calculation of Criteria Pollutant Emission Rates

Constituent	Hourly Potential to Emit (lb/hr) [1]	Annual Potential to Emit (lb/yr) [2]	Annual Potential to Emit (ton/yr)
CO	0.10	891.33	0.45
NOx	0.02	168.63	0.08
PM2.5	0.01	89.75	0.04
PM10	0.01	89.75	0.04
SO_2	0.02	169.63	0.08
VOC	0.01	64.95	0.03

GWP	(Global Warming Potential)	Hourly Potential to Emit (lb/hr) [1]	Annual Potential to Emit (lb/yr) [2]	Annual Potential to Emit (short tons/yr) [3, 4]	Annual Potential to Emit (metric tons/yr) [3, 4]
1	CO_2	160.70	1,407,726.21	703.86	639.11
21	CH_4 (in CO_2e)	0.70	6,128.62	3.06	2.78
310	N_20 (in CO_2e)	0.56	4,934.74	2.47	2.24
	Total GHG (in CO_2e):	161.96	1,418,789.57	709.39	644.13

(1) - PTE for PM10 and PM2.5 are the same.

(2) - Annual potential to emit is based on 8,760 hrs/yr.

(3) - GHG emission factors from: http://www.climateregistry.org/resources/docs/protocols/grp/GRP_3.1_January2009.pdf, Appendix C, Table C1.

(4) - GHG emissions are presented in short tons/yr as well as metric tons/yr.

4.1 Calculation of Hourly PTE

Emission Factor (lb/MMBtu) x Heat Input (MMBtu/hr) = Emissions (lb/hr)

4.2 Calculation of Annual PTE

Hourly PTE (lb/hr) x 8760 hr/yr = Potential Emissions (lb/yr)

Baseline Natural Gas Fired Small Boiler (<10 MMBtu/hr)

Section 5 Emission Rate Calculations for Organic HAPs
Emission factors, from AP-42 (7/98), Section 1.4 Table 1.4-3

Constituent	Emission Factor (lb/mmcf)	Hourly Potential to Emit (lb/hr)	Annual Potential to Emit (lb/yr)	Annual Potential to Emit (ton/yr)
2-Methylnaphthalene	2.40E-05	3.24E-08	2.83E-04	1.42E-07
3-Methylchloranthrene	1.80E-06	2.43E-09	2.13E-05	1.06E-08
7,12-Dimethylbenz(a)anthracene	1.60E-05	2.16E-08	1.89E-04	9.45E-08
Acenaphthene	1.80E-06	2.43E-09	2.13E-05	1.06E-08
Anthracene	2.40E-06	3.24E-09	2.83E-05	1.42E-08
Benz(a)anthracene	1.80E-06	2.43E-09	2.13E-05	1.06E-08
Benzene	2.10E-03	2.83E-06	2.48E-02	1.24E-05
Benzo(a)pyrene	1.20E-06	1.62E-09	1.42E-05	7.09E-09
Benzo(b)fluoranthene	1.80E-06	2.43E-09	2.13E-05	1.06E-08
Benzo(g,h,i)perylene	1.20E-06	1.62E-09	1.42E-05	7.09E-09
Benzo(k)fluoranthene	1.80E-06	2.43E-09	2.13E-05	1.06E-08
Chrysene	1.80E-06	2.43E-09	2.13E-05	1.06E-08
Dibenzo(a,h)anthracene	1.20E-06	1.62E-09	1.42E-05	7.09E-09
Dichlorobenzene	1.20E-03	1.62E-06	1.42E-02	7.09E-06
Fluoranthene	3.00E-06	4.04E-09	3.54E-05	1.77E-08
Fluorene	2.80E-06	3.77E-09	3.31E-05	1.65E-08
Formaldehyde	7.50E-02	1.01E-04	8.86E-01	4.43E-04
Hexane	1.80E+00	2.43E-03	2.13E+01	1.06E-02
Indeno(1,2,3-cd)pyrene	1.80E-06	2.43E-09	2.13E-05	1.06E-08
Naphthalene	6.10E-04	8.22E-07	7.20E-03	3.60E-06
Phenanathrene	1.70E-05	2.29E-08	2.01E-04	1.00E-07
Pyrene	5.00E-06	6.74E-09	5.90E-05	2.95E-08
Toluene	3.40E-03	4.58E-06	4.02E-02	2.01E-05
Total		0.00	22.23	0.01

5.1 Calculation of Annual Emissions

Emission Factor (lb/mmcf) x Fuel Usage (cf/yr)/ 10^6 cf/mmcf = Actual Emissions (lb/yr)
Actual Emissions (ton/yr) = Actual Emissions (lb/yr) / 2000 lbs/ton

5.2 Calculation of Hourly PTE

Emission Factor (lb/mmcf) x Fuel Usage (cf/hr) / 10^6 cf/mmcf = Emissions (lb/hr)

5.3 Calculation of Annual PTE

Hourly PTE (lb/hr) x 8760 hr/yr = Potential Emissions (lb/yr)
Potential Emissions (ton/yr) = Potential Emissions (lb/yr) / 2000 lbs/ton

APPENDIX F

SUMMARY OF CONSTRUCTION EQUIPMENT EXHAUST AND FUGITIVE EMISSIONS

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Summary of Construction Equipment Exhaust and Fugitive Emissions

Equipment	Horsepower	Annual Operation	Hours or Miles	Total NOx lbs/hr	NOx lbs/day	NOx TPY	VOC lbs/hr	VOC lbs/day	VOC TPY	CO lbs/hr	CO lbs/day	CO TPY	SOx lbs/hr	SOx lbs/day	SOx TPY	PM10 lbs/hr	PM10 lbs/day	PM10 TPY	PM2.5 lbs/hr	PM2.5 lbs/day	PM2.5 TPY	CO2 TPY	Fuel Use (gallns/Year)
Asphalt Paver	300	120	Hours	1.85	14.80	0.111	0.13	1.06	0.008	1.72	13.74	0.103	0.00	0.00	0.000	0.10	0.79	0.006	0.10	0.79	0.006	21.00	1878
Motored Grader	400	120	Hours	2.47	19.74	0.148	0.18	1.41	0.011	2.29	18.33	0.137	0.00	0.00	0.000	0.13	1.06	0.008	0.13	1.06	0.008	27.99	2504
Scraper	400	120	Hours	2.47	19.74	0.148	0.18	1.41	0.011	2.29	18.33	0.137	0.00	0.00	0.000	0.13	1.06	0.008	0.13	1.06	0.008	27.99	2504
Track Hoe	150	120	Hours	0.93	7.40	0.056	0.07	0.53	0.004	1.22	9.78	0.073	0.00	0.00	0.000	0.07	0.58	0.004	0.07	0.58	0.004	10.50	939
Vibratory Compactor	100	120	Hours	0.62	4.93	0.037	0.04	0.35	0.003	0.81	6.52	0.049	0.00	0.00	0.000	0.05	0.39	0.003	0.05	0.39	0.003	7.00	626
Wheeled Dozer	350	120	Hours	2.16	17.27	0.130	0.15	1.23	0.009	2.00	16.04	0.120	0.00	0.00	0.000	0.12	0.93	0.007	0.12	0.93	0.007	24.50	2191
Air Compressor	150	1,042	Hours	0.93	7.40	0.482	0.07	0.53	0.004	1.22	9.78	0.073	0.00	0.00	0.000	0.07	0.58	0.004	0.07	0.58	0.004	91.12	8152
Air Compressor	150	1,042	Hours	0.93	7.40	0.482	0.07	0.53	0.004	1.22	9.78	0.073	0.00	0.00	0.000	0.07	0.58	0.004	0.07	0.58	0.004	91.12	8152
Concrete Truck		675	Miles	0.01	0.01	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	1.20	
Flat Bed Truck		675	Miles	0.01	0.01	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	1.20	
Haul Trucks (4)[4]		3,600	Miles	0.03	0.03	0.002	0.02	0.02	0.001	0.02	0.02	0.001	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	6.40	
Water Truck		675	Miles	0.01	0.01	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	1.20	
Workers Commute[5]		58,590	Miles	0.07	0.07	0.005	0.14	0.14	0.009	2.13	2.13	0.139	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0.000	23.75	
Fugitive Dust																2.67	10.72	0.08	0.00	0.03	0.00		
					98.80	1.60		7.21	0.05		104.45	0.77		0.00	0.000		16.69	0.13		5.99	0.05	311.23	26,947

Notes:

1. All off-road euqipment is assumed to be EPA Certified Tier III engines.
2. Diesel fuel is CARB Ultra-Low Sulfur Fuel (0.0015%).
3. For off-road equipment, PM2.5 emissions are assumed to equal PM10 emissions.
4. Haul trucks assumes 4 vehicles traveling 60 miles per day, 5 days per week, for 3 weeks.
5. Worker commute assumes 15 vehicles traveling 30 miles per day, 5 days per week, 4.34 weeks per month for 6 months.

APPENDIX G

USEPA EXHAUST EMISSION STANDARDS FOR HEAVY-DUTY OFF-ROAD DIESEL CYCLE ENGINES (g/bhp-hr)

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USEPA Exhaust Emission Standards for Heavy-Duty Off-Road Diesel Cycle Engines (g/bhp-hr)

Engine Power (hp)	Model Years	Regulation	Emission Standards (g/hp-hr)					Year the Std Takes Effect
				HC	NOx	NMHC+NOx	CO	PM	
50 to <75	pre-1998	Tier 0		1.12	14.06	15.18	3.03	0.984	
	1998-2003	Tier 1		1.12	6.90	8.02	3.03	0.98	1998
	2004-2007	Tier 2	0.40	0.3996	5.20	5.60	3.70	0.30	2004
	2008-2012	Tier 3	0.20	0.1998	3.3	3.50	3.70	0.30	2008
≥75 to <100	pre-1998	Tier 0		1.12	14.06	15.18	3.03	0.984	
	1998-2003	Tier 1		1.12	6.90	8.02	3.03	0.98	1997
	2004-2007	Tier 2	0.40	0.3996	5.20	5.60	3.70	0.30	2003
	2008-2011	Tier 3	0.20	0.1998	3.3	3.50	3.70	0.30	2007
≥100 to <175	pre-1997	Tier 0		1.12	14.06	15.18	3.03	0.984	
	1997-2002	Tier 1		1.12	6.90	8.02	3.03	0.98	1997
	2003-2006	Tier 2	0.40	0.3996	4.5	4.90	3.70	0.22	2003
	2007-2011	Tier 3	0.20	0.1998	2.8	3.00	3.70	0.22	2007
≥175 to <300	pre-1996	Tier 0		1.12	14.06	15.18	3.03	0.984	
	1996-2002	Tier 1	1.00	0.9990	6.90	7.90	8.50	0.40	1996
	2003-2005	Tier 2	0.40	0.3996	4.5	4.90	2.60	0.15	2003
	2006-2010	Tier 3	0.20	0.1998	2.8	3.00	2.60	0.15	2006
≥300 to <600		Tier 0		1.12	14.06	15.18	3.03	0.984	
	1996-2000	Tier 1	1.00	0.9990	6.90	7.90	8.50	0.40	1996
	2001-2005	Tier 2	0.30	0.2997	4.5	4.80	2.60	0.15	2001
	2006-2010	Tier 3	0.20	0.1998	2.8	3.00	2.60	0.15	2006
≥600 to ≤750	pre-1996	Tier 0		1.12	14.06	15.18	3.03	0.984	
	1996-2001	Tier 1	1.00	0.9990	6.90	7.90	8.50	0.40	1996
	2002-2005	Tier 2	0.30	0.2997	4.5	4.80	2.60	0.15	2002
	2006-2010	Tier 3	0.20	0.1998	2.8	3.00	2.60	0.15	2006
>750 except generator sets	pre-2000	Tier 0		1.12	14.06	15.18	3.03	0.984	
	2000-2005	Tier 1	1.00	0.9990	6.90	7.90	8.50	0.40	2000
	2006-2010	Tier 2	0.30	0.2997	4.5	4.80	2.60	0.15	2006
Generator sets >750 to ≤1200	pre-2000	Tier 0		1.12	14.06	15.18	3.03	0.984	
	2000-2005	Tier 1	1.00	0.9990	6.90	7.90	8.50	0.40	2000
	2006-2010	Tier 2	0.30	0.2997	4.5	4.80	2.60	0.15	2006
Generator sets >1200	pre-2000	Tier 0		1.12	14.06	15.18	3.03	0.984	
	2000-2005	Tier 1	1.00	0.9990	6.90	7.90	8.50	0.40	2000
	2006-2010	Tier 2	0.30	0.2997	4.5	4.80	2.60	0.15	2006

Emission Factors Mobile Equipment

	Emission Factor (lb/mi) [1,2,3]						
Year	NOx	VOC	CO	SOx	Non-Idle PM10	Non-Idle PM2.5	CO2
HDDV: Trucks - 2013	0.0011	0.0007	0.0006	0.0000	0.0000	0.0000	3.5577
LDGV : Cars - 2013	0.0002	0.0003	0.0047	0.0000	0.0000	0.0000	0.8106

Notes:

1. Vehicle class used in calculation are HDDV8B - Class 8b Heavy-Duty Diesel Vehicles (>60,000 lbs GVW).
2. Emission Factor Source: Air Emissions Factor Guide to Air Force Mobile Sources, December 2009
3. Emission factors converted from grams per mile to lbs/mile (gr/mi * 1 lb/454 gr). 1 pound = 454 grams

GHG Emission Factors Construction Equipment

GHG Pollutant Constituent	Emission Factor[3] (KG /gallon)	Emission Factor[3] (lb/gallon)	Total Fuel Use (gallons)
CO_2	10.15	22.357	26,947
CH_4	0.00058	0.0013	
N_20	0.00026	0.0006	

GHG emission factors from: http://www.climateregistry.org/resources/docs/protocols/grp/GRP_3.1_January2009.pdf, Appendix C, Tables C3 and C6.

Global Warming Potential (GWP)	Constituent	Annual Potential to Emit (lb/yr) (2)	Annual Potential to Emit (short tons/yr)	Annual Potential to Emit (metric tons/yr)
1	CO_2	602,444.59	301.22	273.27
21	CH_4 (in CO_2e)	34.43	0.02	0.02
310	N_20 (in CO_2e)	15.43	0.01	0.01
	Total GHG (in CO_2e):	602,494.45	301.25	273.29

APPENDIX H

ESTIMATED EMISSION RATES - FUGITIVE DUST SOURCES - PM10 AND PM2.5 TRANSFER

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Estimated Emission Rates - Fugitive Dust Sources - PM10 and PM2.5 Transfer

Equipment	Activity	Total # of Equipment	Year	Total Vol. Material Removed, CY	CY Volume Handled By This Equip[4]	# Days Annual Operated	Volume Removed Daily, CY	Daily Hours Operated	Volume Removed Hourly CY	Bucket Size CY	Default Soil Density lbs/YD^3	Tons Removed Hourly	PM_{10} Emission Factor[1] lb/ton	Control Efficiency (%)[3]	PM_{10} Emission Rate lb/hr	PM_{10} Emission Rate lb/day	PM_{10} Emission Rate TPY	$PM_{2.5}$ Emission Factor[1] lb/ton	PM2.5 Emission Rate lb/hr	PM2.5 Emission Rate lb/day	PM2.5 Emission Rate TPY
Back Hoe	Grades Excavated Area	1	2013	1,000	1,000	15	67	8	8	2.5	3,500	14.66	3.57E-04	50%	0.00	0.02	0.000	5.40E-05	0.001	0.006	0.000
Excavator	Grades Excavated Area	1	2013	1,000	1,000	15	67	8	8	2.5	3,500	14.66	3.57E-04	50%	0.00	0.02	0.000	5.40E-05	0.001	0.006	0.000
Front End Loader	Grades Excavated Area	1	2013	1,000	1,000	15	67	8	8	2.5	3,500	14.66	3.57E-04	50%	0.00	0.02	0.000	5.40E-05	0.001	0.006	0.000
Haul Truck[5]	Unloads Common Fill	4	2013	1,000	1,000	15	67	8	8	12.0	3,500	14.66	3.57E-04	50%	0.00	0.02	0.000	5.40E-05	0.001	0.006	0.000
															0.01	0.08	0.00		0.00	0.03	0.00

Notes:
1. Emission factors for soil transfer operations are based on Equations from Section 13.2.4 of AP-42. Emission factor calculations are provided below.
2. Material load to the pile and from pile to the truck is considered as two drops/operations. Amount of material moved is assumed.
3. A 50% control efficiency for fugitive dust has been assigned, for the application of water and other dust BMPs.
4. Wind speed and moisture content assumed.
5. For the haul truck, the total amount of material removed is equal to the total amount of material.
6. Soil density: 3,500 lbs/yd^3.

Transfer/Drop Operation Emission Factor - Sample Calculation for PM_{10} and $PM_{2.5}$:

$E_f = k * (0.0032) * ((U/5)^{1.3} / (M/2)^{1.4})$

where:

E_f = size specific emission factor in pounds per ton (lb/ton)

k = an empirical constant selected from AP-42 (0.35 for PM_{10} and 0.053 for $PM_{2.5}$)

U = mean wind speed in miles per hour (mph) = 9.1

M = material moisture content in percent moisture (%) from the FSEIS (for overburden) = 7.9 moist. %

9.1
7.9

PM_{10} $E_f = 0.35 * (0.0032) * (9.1/5)^{1.3} / (7.9/2)^{1.4}$

= 3.57E-04 lb/ton

$PM_{2.5}$ $E_f = 0.053 * (0.0032) * (9.1/5)^{1.3} / (7.9/2)^{1.4}$

= 5.40E-05 lb/ton

APPENDIX I

ESTIMATED EMISSION RATES - FUGITIVE DUST SOURCES - PM10 AND PM2.5 HAULING, DELIVERY AND DUMP TRUCKS

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Estimated Emission Rates - Fugitive Dust Sources - PM10 and PM2.5 Hauling, Delivery and Pump Trucks

Construction Equipment	Miles Traveled per Vehicle max per hr[1]	Equipment Quantity On-Site/day	Number of Days Operating Per Year	Vehicle Weight[2] (tons)	Paved PM_{10} Factor lb/VMT	Paved PM2.5 Factor lb/VMT[b]	Unpaved PM_{10} Factor lb/VMT[f]	Unpaved PM2.5 Factor lb/VMT[f]	Uncontrolled Emissions[3]						Controlled Emissions[4,8]					
									PM_{10} Emissions lb/hr	PM_{10} Emissions lb/day	PM_{10} Emissions TPY	PM2.5 Emissions[5] lb/hr	PM2.5 Emissions[5] lb/day	PM2.5 Emissions[5] TPY	PM_{10} Emissions lb/hr	PM_{10} Emissions lb/day	PM_{10} Emissions TPY	PM2.5 Emissions[5] lb/hr	PM2.5 Emissions[5] lb/day	PM2.5 Emissions[5] TPY
Motored Grader	0	1	15	30	0.18	0.03			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Scraper	0	1	15	30	0.18	0.03			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wheeled Dozer	0	1	15	30	0.18	0.03			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Haul Trucks (4)	60	4	15	30	0.18	0.03			10.64	42.55	0.32	0.00	0.00	0.00	2.66	10.64	0.08	0.00	0.00	0.00
Total:										42.55	0.32		0.00	0.00		10.64	0.08		0.00	0.00

Notes:

1. Mileage based on round trip between the entrance to Edwards AFB and the on-site work location.
2. The weight of the empty (incoming) and full load (outgoing) 10 cy truck are 20 and 40 tons, respectively. The trucks average is assumed to be 30 tons.
3. These emission rates are based on a maximum distance traveled in one hour; average annual emission rates are likely to be much less.
4. Includes 50% reduction credit for use of water spray controls on-site.
5. PM2.5 emissions are zero for equipment traveling less then 5 mph.
6. Controlled PM10 emissions are 75% controlled for equipment traveling less then 5 mph (This includes a reduction credit for use of water spray controls on-site.)
7. Unpaved fugitive dust emissions are not addressed. The VMT is estimated at 0.05 miles (250 feet).

Unpaved Road Emission Factor - Sample Calculation (Trucks):

$E_f = k * (s/12)^a * (W/3)^b$ Equation 1a from Section 13.2.2 of USEPA's AP-42

where:

E_f = size specific emission factor in pounds per vehicle mile traveled (lb/VMT)

k = an empirical constant selected from AP-42 Table 13.2.2-2 for PM_{10}

s = surface material silt content in percent silt selected from AP-42 Table 13.2.2-1 (for a construction site)

a = an empirical constant selected from AP-42 Table 13.2.2-2 for PM_{10}

W = mean vehicle weight in tons

b = an empirical constant selected from AP-42 Table 13.2.2-2 for PM_{10}

$E_f = 1.5 * (8.5/12)^{0.9} * (40/3)^{0.45}$

E_f = 3.528 lb/VMT

Constant	PM2.5	PM10
k	0.15	1.5
a	0.9	0.9
b	0.45	0.45
	0.00036	0.00047

Silt Content (%):	s	8.5	8.5
Average Weight of Vehicles:	W	30.00	30.00
Capacity of Truck:			20
Empty Truck:			20
			5280

Paved Road Emission Factor - Sample Calculation (trucks):

$E_f = k * (sL/2)^{0.65} * (W/3)^{1.5} - C$ Equation 1 from Section 13.2.1 of USEPA's AP-42

where:

E_f = size specific emission factor in pounds per vehicle mile traveled (lb/VMT)

k = an empirical constant selected from AP-42 Table 13.2.1-1 for PM_{10} and $PM_{2.5}$ = 0.016 and 0.0024

sL = road surface silt loading in grams per square meter selected from FSEIS = 0.4

W = mean vehicle weight in tons = 30 tons

C = Emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear selected from AP-42

PM_{10} $E_f = 0.016 * (0.4/2)^{0.65} * (30/3)^{1.5} - 0.00047$

= 0.18 lb/VMT

Constant	PM2.5	PM10
k	0.0024	0.016
sL	0.4	0.4
C	0.00036	0.00047
W	30	30

APPENDIX J

INDIRECT EMISSIONS ASSOCIATED WITH ALTERNATIVE C

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Indirect Emissions Associated with Alternative C

	Annual		NOx			VOC			CO			SOx			PM10			PM2.5			CO2
Equipment	Operation[3]	Miles	lbs/hr	lbs/day	TPY	lbs/hr	lbs/day	TPY	lbs/hr	lbs/day	TPY	lbs/hr	lbs/day	TPY	lbs/hr	lbs/day	TPY	lbs/hr	lbs/day	TPY	TPY
Transport Trucks	3,600	Miles	3.96	3.96	0.002	2.70	2.70	0.001	2.30	2.30	0.001	0.00	0.00	0.000	0.16	0.16	0.000	0.08	0.08	0.000	6.40
				3.96	0.002		2.70	0.001		2.30	0.001		0.00	0.000		0.16	0.000		0.08	0.000	6.40

Notes:

1. Assumes 60 transport trucks transporting offsite and 60 transport trucks delivering 60 jet engines to Edwards AFB per year.
2. Diesel fuel is CARB Ultra-Low Sulfur Fuel (0.0015%).
3. One trip assumed to equal 30 miles. 30 miles times 60 truck trips per year equals 1,800 total miles per year.